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of The AMERICAN DIETETIC ASSOCIATION

JANUARY 1961 VOLUME 38 NUMBER 1

Radionuclides in Foods
Conrad P. Straub et al.

Nutrition of Cerebral-Palsied Children
Irene P. Karle et al.

Nutrients in Breads from Fourteen Countries
Robert S. Harris et al.

Food Buyers' Preferences for Fruits and Vegetables
Marilyn Dunsing and Karen Bowles

Time and Temperature in Making Custards
Cathrine Miller et al.

44th A.D.A. Annual Meeting
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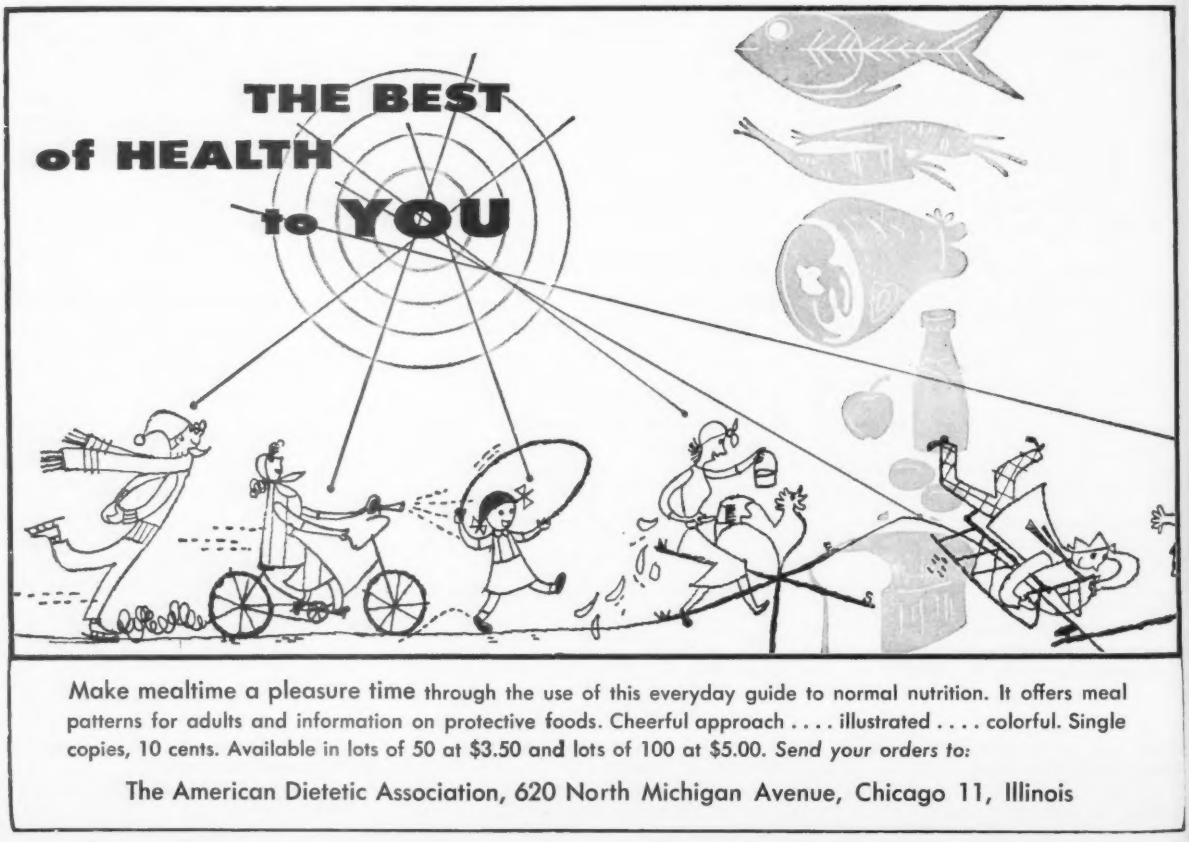

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Radionuclides in Foods[1]

CONRAD P. STRAUB, G. K. MURTHY, and J. E. CAMPBELL[2]

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BEFORE THE potential exposure of populations to radiation can be determined, we must know and understand the pathways of radiation exposure. Radiation exposure originates from environmental, medical, or other sources and results in the internal or external irradiation of human tissue. Except for naturally-occurring radionuclides, particularly potassium, rubidium, and the decay products of the uranium and thorium chains, the bulk of the internal exposure is due to the man-made fission products, the primary source of which is fallout.

Thus, it is necessary to determine the routes by which such fallout will expose man. One attempt at following the movement of radioactive materials through the entire ecosystem is shown in Figure 1. The pathways demonstrated are relatively simple, yet the pattern is rather complex. Neither certain pathways involving animal-to-animal and plant-to-plant relationships have been shown, nor the pathways by which radioactive materials get back to the water or soil environments following the disposal of man's waste products. In actual practice, one must follow each radionuclide through the entire ecosystem to determine its potential impact on exposure to man. Some nuclides deposited in the soil, for example, will be so tightly held that they will not be taken up by plants. Others taken up by plants will be discriminated against during animal metabolism and will not necessarily appear in edible animal products, but will be returned to the environment with the waste products of the animal.

As can be seen, exposure routes include inhalation of air and ingestion of water and food. Therefore, an estimate of the amounts of radioactive materials that would be ingested or inhaled by man from each of these sources must be made. Such estimates have been reported (1, 2) and vary with changes in radioactivity levels.

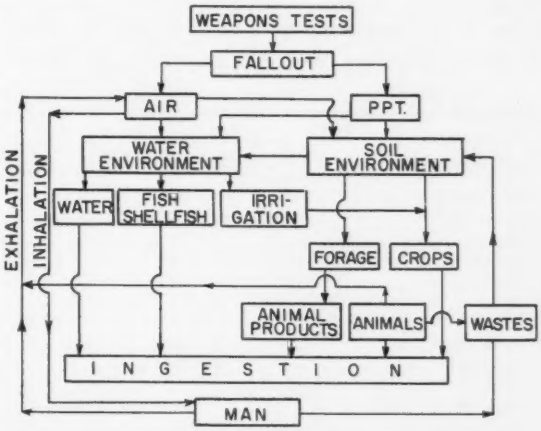

FIG. 2. *Pathways of radiation exposure.*

From the analysis of environmental media and biologic and physical parameters and equations recommended by the International Commission on Radiological Protection (3), the dose resulting from such levels of intake over a given period may be calculated for all the radionuclides responsible for internal exposure. To this total must be added also the exposure from all external sources, including cosmic

[1]Presented at the annual meeting of the Ohio Dietetic Association in Cincinnati, on May 6, 1960.

[2]The authors wish to acknowledge and recognize the work of the members of the Radiological Health Research Activities Unit and the Food Chemistry Section of the Milk and Food Program who were responsible for all of the analytical data reported. Acknowledgment is also made of the fact that the data on dietary intake for the human volunteers were obtained from the analysis of aliquots of composite samples of foods, beverages, and excreta made available through the courtesy of the Kettering Laboratory, Cincinnati, where balance studies on heavy metals are being conducted. The samples represented precise, or as nearly precise as possible, duplicates of normal food intake.

radiation, naturally-occurring gamma-emitting radionuclides, radiation-producing devices, and so on.

Various groups in the United States have studied the amount of radioactivity in food materials. Much of the earlier data, however, were reported in "sunshine" or "strontium units," that is, in terms of the micromicrocuries ($\mu\mu c$) of strontium-90 per gram of calcium for individual food items. Unless calcium or strontium values are given along with the strontium units, one cannot estimate strontium intake. It would appear that the ratio of total strontium-90 intake to the total calcium intake of the diet is of far greater significance.

TABLE 1 Calcium and strontium-90 content of foods

FOOD	ORIGIN	DATE OF SAMPLING	CALCIUM	STRONTIUM-90
			gm./kg.	*μμc/kg.*
Beets	Texas	3–12–59	0.120	10.3
Broccoli	California	3–12–59	1.127	5.3
Cabbage	Texas	3–12–59	0.355	7.1
Carrots	California	3–12–59	0.363	4.1
Cauliflower	California	3–12–59	0.196	2.3
Celery	California	3–12–59	0.620	2.8
Coconut	South Seas	3–12–59	0.128	1.7
Cucumber	Michigan	9–23–59	0.111	13.3
Kale	unknown	3–12–59	0.785	74.7
Lettuce	California	3–12–59	0.183	1.4
Mustard greens	unknown	9–23–59	1.422	40.0
Potato	Idaho	3–12–59	0.100	1.4
Radish	Florida	3–12–59	0.256	3.4
Spinach	Texas	3–12–59	1.406	36.5
String beans	Florida	3–12–59	0.515	43.2
Sweet potato	Tennessee	3–12–59	0.241	13.5
Turnip	Florida	3–12–59	0.422	10.6
Turnip greens	Florida	9–23–59	2.703	32.0
White flour	Minnesota	3–12–59	0.513	25.2
Whole wheat flour	Minnesota	9–23–59	0.266	56.2
Whole wheat flour	Minnesota	1– –60	0.328	47.5

*Single samples of the foods indicated were assayed.

Others have reported gross activity levels in certain food substances, both before and after correction for the naturally-occurring potassium. Again, such levels are meaningless insofar as indicating the potential intake of nuclides of importance. In some cases, the nuclides of interest were estimated on the basis of fission product composition from weapons tests; but such estimates could be in error. Radiochemical or instrumental (gamma spectroscopy) techniques must be used to identify the specific radionuclides present (4).

Most of the measurements made to date have been concerned with specific components of the diet or food materials. However, several studies have been made of total dietary intake, the most extensive being the one done by the British (5). Consumer's Union has made a study of dietary intake for population centers in the United States (6).

The Cincinnati investigations have been directed toward obtaining a better estimate of the average values of specific radionuclides in foods and in diets, particularly those purchased on the Cincinnati market, and their effect on dietary intake. In most instances, individual food items were analyzed; in others, the individual food items were composited according to food types before analysis, and specific meals were purchased and analyzed.

The significance of the findings on the dietary intake of radionuclides, particularly that of strontium-90, will be discussed below in detail.

Results and Discussion

The activity levels in various food materials pur-

TABLE 2 Calcium, potassium, gross alpha and beta activity and specific radionuclide content of foods

SAMPLE*	DATE OF SAMPLING	CALCIUM	POTASSIUM	GROSS BETA ACTIVITY	STRONTIUM 89	STRONTIUM 90	BARIUM-140†	CESIUM 137‡	ZINC 65	ZIRCONIUM-95 +NIOBIUM-95	RUTHENIUM-106 +RHODIUM-106	GROSS ALPHA ACTIVITY
		gm./kg.	*gm./kg.*	←				*μμc/kg.*				→
Eggs	9/23/58	0.695	1.369	1,360	—#	3.0	0	2.0	6	—	0	0.52
Fruits	8/28/58	0.178	2.484	2,190	—	3.7	2.4	63.4	3	6	22	—
Fruit juices	9/23/58	0.128	1.791	1,780	—	2.1	0	31.2	—	—	—	0.08
Pastries	7/23/58	0.428	1.307	1,180	0	10.6	0	75.0	—	5	15	0.28
Cereals	6/12/58	0.480	1.365	2,540	—	12.4	0	113.5	—	50	134	0.12
Dairy products	7/16/58	4.836	—	540	61	39.0	0	21.2	—	—	—	0
Sea foods	7/16/58	0.335	—	2,310	0	0.2	0	24.8	—	—	—	—
Meats	8/27/58	0.172	3.483	2,520	0	1.0	0	160.0	17	6	26	0.10
Leafy vegetables	8/4/58	0.508	3.404	2,840	21	3.9	12.2	49.0	12	69	220	0
Root vegetables	8/4/58	0.273	3.632	3,230	46	12.5	2.8	53.3	10	13	60	0
Legumes and corn	8/4/58	0.234	3.132	3,240	32	7.5	0	57.0	4	13	83	0
Instant coffee	6/20/58	1.900	44.280	40,100	31	19.0	0	1,860.0	—	58	0	—
Instant tea	7/23/58	0.150	45.320	45,300	150	60.0	—	894.0	—	420	1,150	—
Mixed nuts	8/26/58	0.727	6.975	6,300	—	8.2	0	348.0	—	—	—	2.23
	9/23/58	0.643	6.650	6,110	6	8.1	0	208.0	—	—	—	0.19
Rice	8/26/58	0.196	0.811	740	—	1.2	0	95.0	—	5	19	0
Milk	1958	1.145	—	—	55	8.5	24	75.0	4	0	0	0

*Single samples assayed or single samples of mixed foods assayed.
†Uncorrected for decay to time of collection.
‡In ash only.
#Not determined.

TABLE 3 Calcium and strontium-90 content of mixed foods

DATE OF SAMPLING	CALCIUM	STRONTIUM-90
Milk		
	gm./kg.	*μμc/kg.*
1958-59	1.150	11.9
Dairy Products (Other than Milk)		
July, 1958	4.836	39.0
October, 1959	3.033	38.2
January, 1960	3.643	46.3
Average	3.837	41.2
Leafy Vegetables		
August, 1958	0.508	3.9
October, 1959	0.646	14.6
January, 1960	0.634	11.1
Average	0.596	9.9
Root Vegetables		
August, 1958	0.273	12.5
October, 1959	0.252	9.4
January, 1960	0.235	3.9
Average	0.253	8.6
Legumes and Corn		
August, 1958	0.234	7.5
October, 1959	0.312	6.3
January, 1960	0.254	4.8
Average	0.267	6.2
Cereals		
August, 1958	0.428	12.4
January, 1960	0.534	14.3
Average	0.481	13.4
Pastries		
August, 1958	0.480	10.6
January, 1960	0.394	9.3
Average	0.437	9.9

chased on the Cincinnati market are summarized in Table 1 and show that radionuclide levels varied for the different food items analyzed. For example, strontium-90 levels varied from a low of 1.4 μμc per kilogram for lettuce and potatoes to a high of 74.7 for kale.

Examination of Tables 1 to 5 shows great variability in the individual food activity levels. This variability was associated with a wide variety of factors, including fallout pattern, meteorology, and soil composition, in the area in which the crops were grown. The relation of these factors to growing season and harvest period cannot be minimized.

The levels of radiostrontium, radium, and calcium for cabbage, lettuce, tomatoes, corn, potatoes, apples, and grains are presented in Table 6. Considerable variation was found in cabbage and lettuce, with some very high values in the samples collected in 1958. These levels probably reflected the effects of highly localized fallout from continental weapons tests held during the fall of 1958. Seed crops, such as tomatoes and corn, showed somewhat lower levels of activity, not exceeding 18 μμc strontium-90 per

TABLE 4 Calcium and strontium-90 in breakfasts sampled in January 1960

MEAL	CALCIUM	STRONTIUM-90
	gm./meal	*μμc/meal*
No. 1*	0.136	2.0
No. 2†	0.597	3.9
No. 3‡	0.310	5.1
No. 4#	0.310	3.7
No. 5¶	0.397	5.4
No. 6‖	0.122	1.2
No. 7**	0.200	3.4
No. 8††	0.279	4.5

*Fried eggs, 92.3 gm.; buttered toast, 40.1 gm.; sausage, 89.1 gm.; apple jelly, 12.6 gm.; coffee, black with sugar, 143.5 gm. Total: 377.6 gm.

†Bacon, 24.2 gm.; pancakes, 200.7 gm.; corn sirup, 58 gm.; coffee, black with sugar, 136.5 gm. Total: 419.4 gm.

‡Doughnuts, 103.7 gm.; milk, 245.7 gm. Total: 349.4 gm.

#Grapefruit juice, 185.2 gm.; 2 fried eggs, 102 gm.; buttered toast, 64.2 gm.; jelly, 17.5 gm.; milk, 244.5 gm. Total: 613.4 gm.

¶Orange juice, 178.2 gm.; cornflakes with milk, 181.5 gm.; milk, 245 gm.; coffee, 165.4 gm. Total: 770.1 gm.

‖Stewed prunes, 171.5 gm.; 1 fried egg, 39.8 gm.; ham, 63.3 gm.; buttered toast, 67.6 gm.; jelly, 11.3 gm.; coffee, 160.2 gm. Total: 513.7 gm.

**Tomato juice, 175.2 gm.; oatmeal with milk and sugar, 387.3 gm.; buttered toast, 68.2 gm.; jelly, 15.1 gm.; coffee, 169.3 gm. Total: 815.1 gm.

††Cornflakes, 30.1 gm.; milk, 150.4 gm.; 1 egg, 39 gm.; 3 strips of bacon, 15.9 gm.; buttered toast, 66.5 gm.; coffee, 157.1 gm. Total: 459 gm.

kilogram fresh weight. Potatoes generally showed the lowest levels, as would be expected, inasmuch as they grow below the ground and are influenced primarily by soil activity levels. Levels of activity for apples varied, being quite low in most instances. In one case, a value of 66 μμc strontium-90 per kilogram fresh weight was reported, but again, this was due to the highly localized fallout that occurred during the growing period of the fruit. Grains generally showed high and very variable strontium-90 levels. The barley values are for samples collected in Germany and Ireland, respectively. These values are very high as are the upper values for oats and wheat.

ACTIVITY LEVELS IN GROUPED FOODS, MEALS, AND MILK

In Table 2, data are presented on calcium, potassium, gross alpha and beta activity, strontium-89, strontium-90, barium-140, cesium-137, zinc-65, zirconium-95 plus niobium-95, and ruthenium-106 plus rhodium-106 for specific groups of food materials purchased on the Cincinnati market. Considerable variation is observed.

For example, the strontium-90 levels ranged from a low of 0.2 μμc per kilogram for sea foods to a high of 60.0 for instant tea powder. Cesium-137 values likewise varied over an extended range from a low of 2.0 μμc per kilogram for eggs to a high of 1,860 for instant coffee powder. Potassium-40 values were

calculated (Table 7) from the stable potassium data reported in Table 2 and ranged from 692 μμc per kilogram for rice to a high of over 37,700 for instant tea powder. The highest alpha activity levels were encountered in the mixed nut sample collected in 1958; other foods, such as vegetables, showed no alpha activity. The high alpha activity in mixed nuts was attributed to the presence of Brazil nuts.

Data on the calcium and strontium-90 contents of mixed foods are shown in Table 3. Some variation with time is indicated and is due to differences in precipitation and fallout patterns in the specific areas in which the foods were grown as well as the time of harvest.

Analyses have also been made of a series of breakfasts and lunches described in Tables 4 and 5. The calcium levels in the breakfasts ranged from 0.122 to 0.597 gm. per meal and the strontium-90 levels from 1.2 to 5.4 μμc per meal. Mean values were 0.294 gm. per meal and 3.6 μμc per meal, respectively. For the lunches, the per-meal calcium levels ranged from 0.116 to 0.510 gm. and the strontium-90 from 2.1 to 7.7 μμc. Mean values per meal were 0.260 gm. and 5.0 μμc respectively.

Weekly intake levels of strontium-90 in food materials consumed by two human volunteers ranged from a low of 8.4 to 168 μμc for one subject and from 14.2 to 80.5 μμc for the other. Median intake values amounted to 28.4 and 32.0 μμc strontium-90 per week, respectively.

Data on radioactivity levels in milk have been published and have shown marked variation between stations as well as seasonal variation during a given year (7). During 1959, the strontium-90 levels in milk arranged from about 1.0 to 37 μμc per liter for the twelve milk sheds from which samples were collected monthly.

REPORTING OF DATA

The reporting of "strontium units" or "sunshine units" for grains, or any other food substances, may be misleading. For grains, these values range from approximately 17.5 to 580 μμc strontium-90 per gram calcium. Their meaning cannot be interpreted except possibly to indicate discrimination between strontium and calcium as one moves through the plant and animal food chains. Attempts have been made to relate these numbers to the calculated strontium-90 to calcium levels in bone.

Use of strontium units implies equivalent biochemical utilization of strontium and calcium by plants or animals and provides no information regarding metabolic relationships of these two elements[3].

[3]Since preparation of this paper, an excellent review of metabolic relationships of strontium and calcium has appeared as Supplement 167 of Acta Physiologica Scandinavica (8).

TABLE 5 Calcium and strontium-90 in lunches

LUNCH	DATE OF SAMPLING	CALCIUM	STRONTIUM-90
		gm./meal	*μμc/meal*
No. 1*	Oct. 1959	0.268	6.1
No. 2†	Nov. 1959	0.158	6.5
No. 3‡	Nov. 1959	0.352	6.7
No. 4#	Nov. 1959	0.261	7.7
No. 5¶	Nov. 1959	0.173	2.2
No. 6‖	Dec. 1959	0.242	2.6
No. 7**	Dec. 1959	0.510	6.8
No. 8††	Jan. 1960	0.259	4.3
No. 9‡‡	Jan. 1960	0.116	2.1

*Tossed salad with dressing, 34.5 gm.; frankfurters, 105.7 gm.; creamed potatoes, 193.2 gm.; peas, 76.4 gm.; white bread, 43.1 gm.; butter, 5 gm.; milk, 250 gm. Total: 707.9 gm.

†Eggs, celery, and lettuce salad, 82.7 gm.; roast beef, 121.4 gm.; rice, 139 gm.; creamed green beans, 114.4 gm.; rye bread, 41.3 gm.; cherry pie, 150.7 gm.; coffee with cream and sugar, 162.7 gm. Total: 812.2 gm.

‡Tossed salad with dressing, 73.6 gm.; roast pork, 144.3 gm.; peas, 80.9 gm.; beets, 68.3 gm.; 1 slice rye and 1 slice white bread, 41.8 gm.; creamed potatoes, 90.5 gm.; milk, 250 gm. Total: 749.4 gm.

#Strawberry flavored Jell-O, 159.2 gm.; fried chicken, 104.5 gm.; candied carrots, 108 gm.; mustard greens, 102 gm.; white bread, 38.5 gm.; butter, 5 gm.; pineapple, 144.5 gm.; hot tea, 161.5 gm. Total: 823.2 gm.

¶Fried fish with tartar sauce, 89.8 gm.; mixed vegetables —corn, carrots, Lima beans, and stringbeans, 118.1 gm.; stewed tomatoes, 94.1 gm.; rye bread, 43 gm.; butter, 5 gm.; pineapple pudding with whipped cream and chocolate chip, 110.1 gm.; vegetable juice, 186.5 gm. Total: 647.1 gm.

‖Chopped liver and lettuce sandwich, 95.3 gm.; split pea soup, 219.2 gm.; peach pie, 171.6 gm.; milk, 177.8 gm. Total: 663.9 gm.

**Spaghetti with cheese, 208 gm.; tossed salad with dressing, 80 gm.; carrots, 91.3 gm.; bread, 40.2 gm.; butter, 5 gm.; milk, 245.6 gm. Total: 669.8 gm.

††Roast beef sandwich: 2 slices of bread, 34.8 gm. and roast beef, 47.3 gm.; gravy, 63 gm.; milk, 244 gm.; French fried potatoes, 142.3 gm. Total: 531 gm.

‡‡Fish sandwich: 2 slices of bread, 33.6 gm. and fish, 88 gm.; tossed salad with French dressing, 106 gm.; fruit Jell-O, 223.2 gm.; coffee with cream and sugar, 142.8 gm. Total: 593.6 gm.

Similarly, reporting of gross activity levels in food materials is of limited value. From the data given in Table 7, it will be seen that, in all cases except cereals, the greater part of the activity present was due to the naturally-occurring potassium-40. The identified man-made radionuclides amounted to 0.85 to 16.3 per cent of the total gross beta activity. In all cases except cereals, the potassium-40 totalled from 82 to 100 per cent of the gross beta activity. Thus, total nuclide content identified, including the potassium-40 content, ranged from 87 to 100 per cent. In the case of the cereals, only 58 per cent of the nuclides were identified. It would be of interest to identify the nature and kinds of residual activity present.

TABLE 6 **Radioactivity levels in foods**

LOCATION OR FOOD	YEAR	NUMBER OF OBSERVATIONS	NUCLIDES (wet weight)			STABLE CALCIUM	SOURCE OF DATA*
			Strontium-90	Strontium-89	Radium-226		
Cabbage							
			←	*μμc./kg.*	→	*gm./kg.*	
Texas	1959	1	7.1			0.355	C
California	1958–59	2	2.0—5.1				D
Ohio	1958–59	1	7.2				D
Minnesota	1958–59	1	8.8				D
Illinois	1958–59	1	14				D
Kansas	1958–59	1	6.4				D
New Jersey	1959	3	1—20				A
Colorado-New Mexico	1958	3	97—315	6.4—74(2)†	1.7—3.8		E
Colorado-New Mexico	1958	1	120				E
Colorado-New Mexico	1959	1	3.0				E
Lettuce							
California	1959	1	1.4			0.183	C
California	1958–59	3	5.4—17				D
Colorado-New Mexico	1958–59	2	19—970	13,400(1)	4.5—5.5		E
California	1958	1	21.1	30.4			A
Tomatoes							
Germany	1958	1	2.2			0.082	B
Ticino	1959	1	5.2			0.145	B
New Jersey	1959	4	2—13				A
Colorado-New Mexico	1959	2	2.5—10	2.4—8.6	1.2(1)		E
Corn							
New Jersey	1959	5	1.0—6.0				A
Colorado-New Mexico	1958	3	3.1—18	0—1,470(2)	1.5(1)		E
Colorado-New Mexico	1959	4	0.2—4.6				E
Potatoes							
Germany	1958	1	12.3			0.236	B
California	1958–59	1	0.5				D
Ohio	1958–59	1	7.3				D
Texas	1958–59	1	3.2				D
Illinois	1958–59	1	1.8				D
Maryland	1958–59	1	5.1				D
Kansas	1958–59	1	3.3				D
Colorado-New Mexico	1958	2	4.1—5.4	7.1(1)			E
Colorado-New Mexico	1959	1	0.4				E
Idaho	1959	1	1.4			0.100	C
New York City purchase	1959	1	3.9			0.06	B
Apples							
Germany	1958	1	7.5				B
Iran	1958	1	2.7				B
New Jersey	1959	1	1.0				A
Colorado-New Mexico	1958	1	66		1.8		E
Colorado-New Mexico	1959	4	0.4—2.0				E
Grains							
Barley	1958	2	105—314			0.51—0.54	B
Oats (whole grain)	1958-59	3	10—164				B, E
Rice	1958	1	2.1			0.12	B
Wheat	1958-59	11	4.8—520			0.27—0.97	B, E
Flour, white	1959	1	25.2			0.51	C
Flour, whole wheat	1959-60	2	48—56			0.27—0.33	C

*A = Radiological Health Research Activities, Robert A. Taft Sanitary Engineering Center, U.S. Public Health Service, unpublished data; B = Dr. John Harley, HASL-77, USAEC, New York Operations Office, New York, New York; C = Dr. G. K. Murthy, Milk and Food Program, Robert A. Taft Sanitary Engineering Center, U.S. Public Health Service, unpublished data; D = Food and Drug Administration, HASL-77, USAEC, New York Operations Office, New York, New York; E = Dr. E. C. Tsivoglou, Water Pollution Control Division, Robert A. Taft Sanitary Engineering Center, U.S. Public Health Service, unpublished data.

†Numbers in parentheses indicate number of observations.

TABLE 7 **Activity levels accounted for by radionuclide analyses**

FOOD	NUCLIDES IDENTIFIED EXCLUSIVE OF POTASSIUM-40*	PER CENT OF GROSS ACTIVITY	POTASSIUM-40 LEVELS CALCULATED FROM STABLE POTASSIUM LEVELS	TOTAL NUCLIDES IDENTIFIED	GROSS BETA ACTIVITY*	TOTAL NUCLIDES IDENTIFIED
	μμc/kg.		*μμc/kg.*	*μμc/kg.*	*μμc/kg.*	
Eggs	11.5	0.85	1,169	1,181	1,360	87
Fruits	101	4.6	2,121	2,222	2,190	100
Fruit juices	33.4	1.9	1,530	1,563	1,780	88
Pastries	106	9.0	1,116	1,222	1,180	100
Cereals†	310	12	1,166	1,476	2,540	58
Meats	210	8.4	2,974	3,184	2,520	100
Leafy vegetables	387	14	2,907	3,294	2,840	100
Root vegetables	198	6.1	3,102	3,300	3,230	100
Legumes and corn	196	6.1	2,675	2,871	3,240	88
Instant coffee powder	1,970	4.9	37,815	39,785	40,100	99
Instant tea powder	2,670	5.9	38,703	41,373	45,300	92
Mixed nuts #1	358	5.7	5,957	6,315	6,300	100
Mixed nuts #2	212	3.5	5,679	5,891	6,110	96
Rice	120	16.3	692	812	740	100

*Values taken from Table 2
†Exclusive of rice

SIGNIFICANCE OF RADIOACTIVITY LEVELS IN FOODS

In terms of potential human exposure, the radionuclide content of foods is important only as it relates to the amount of activity consumed with the specific substance. Of greater importance, obviously, is the amount of each radionuclide retained in the human body. It is only this radioactive material which results in internal exposure. It must be considered in terms of short-time detention, as in the case of radiation exposure to the gastrointestinal tract from the temporary storage of food materials, as well as in terms of long-term retention, as for retention of strontium-90 or radium-226 in bone tissue. Studies are under way to measure retention of radionuclides currently found in market foods and other environmental sources. The few data available are insufficient to draw any specific conclusions.

The amount of radionuclide ingested is a function of the radioactivity in the food under discussion as well as the amount of this food included in the average diet. The potential hazard, if any, from the radioactivity ingested in food is a function of the metabolic rate of the radioactive element in question. For example, the highest strontium-90 levels encountered in terms of micromicrocuries per kilogram were associated with samples of instant coffee and instant tea powders. When equating the high levels of strontium-90 in instant tea or coffee to actual amount consumed, this only amounts to about 0.014 or 0.045 μμc strontium-90 per cup.

If activity levels reported for certain foods are based on levels in the raw food, processing for serving may reduce levels somewhat. In this instance, washing of lettuce has been shown to reduce the strontium-90 content by 75 per cent, while the paring of carrots resulted in a reduction of 91 per cent.

The possibility of calculating activity levels in meals from the activity levels of their constituents is of considerable interest because it obviates the need of anlyzing each meal. From the known composition of the eight breakfasts and nine lunches given in Tables 4 and 5, the strontium-90 and calcium contents were calculated and compared with the values obtained by analysis of the meals. In the case of the breakfasts, the calculated or estimated calcium value exceeded the observed calcium value by 2.7 per cent and the estimated strontium-90 value exceeded the observed value by 14 per cent. In lunches, the corresponding value for calcium was 22 per cent and for strontium-90 the value was less by 4 per cent. These values show that such estimates can generally be made with a fair degree of accuracy. Accuracy depends on how applicable the individual food values are to similar constituents found in the respective meals.

Computations of the amounts of strontium-90 that would be ingested or inhaled by man from different sources are presented in Table 8 and show that 5.2 per cent of the total intake came from air, 5.2 per cent from water, 50.5 per cent from milk and dairy products, and 39.1 per cent from other foods. This distribution gave a total intake of 107.7 μμc per week or 15.4 per day. If we assume that the activity levels in suppers or dinners are similar to those given for the lunches listed in Table 5, the total daily intake, including activity levels for water and air, would amount to 7.0 to 22.4 μμc. Similarly, the daily intake for the two volunteers amounted to 2.8 to 25.6 μμc for Subject 1 and 3.6 to 13.1 μμc for Subject 2. Thus, it will be seen that all these approaches give essentially similar results.

These levels may be compared to derived intake values calculated from the inhalation and ingestion

TABLE 8 Environmental sources of calcium and strontium-90 intake in Cincinnati, 1958-59

SOURCE	ESTIMATED WEEKLY INTAKE	CALCIUM		STRONTIUM-90	
		Weight	Per cent	Weight	Per cent
		gm./week		*μμc/week*	
Air	140m³			5.6	5.2
Water	7 l.	0.4	5.0	5.6	5.2
Food	(10.1 kg.)*	(7.6)	(95.0)	(87.8)	(89.6)
Milk	3.5 kg.	4.2	52.6	42.0	39.0
Other dairy products†	0.3 kg.	1.0	12.5	12.4	11.5
Vegetables	2.6 kg.	1.0	12.5	23.7	22.0
Meat, sea foods, and eggs	2.6 kg.	0.7	8.8	5.9	5.4
Cereals and pastries	0.9 kg.	0.4	5.0	9.5	8.8
Other	0.9 kg.	0.3	3.7	3.0	2.8
Totals					
Per week		8.0	100.0	107.7	100.0
Per day		1.1		15.4	

*Totals in parentheses.
†Exclusive of milk.

values given in the recommendations of the International Commission on Radiological Protection (ICRP) (3) which amount to an occupational intake of approximately 2,000 μμc per day as the maximum permissible concentration that will not exceed the given body burden of 2 μc strontium-90 over a period of fifty years. Reducing this value by a factor of one-thirtieth to convert it to the so-called *average* permissible population value, a value of 67 μμc per day is obtained. It will be seen that current Cincinnati levels (for maximum and minimum values indicated above) appear to be in the order of 4 to 38 per cent of the *average* permissible population level.

Obviously, this will vary with the dietary habits of the individual. Intake levels also depend on geographic food habits and in part, too, on the areas in which specific food substances are grown in relation to the fallout pattern in these areas. Since large quantities of foods may be grown in one area and shipped to other areas, this tends toward a uniformity of intake which would not occur with complete dependence on locally grown foods.

Similar calculations must be made for all other nuclides before exposure doses may be estimated. The comparative level of strontium-90 intake (67 μμc per day) assumes that strontium-90 is the sole source of activity. If other nuclides are present, this level must be reduced by the dose level contributed from these sources.

Summary

Food samples were purchased on the Cincinnati market and analyzed for specific radionuclides, both individually and in composites, according to food types. These results were listed with others obtained elsewhere. Considerable variation in radioactivity levels was indicated.

From the observed results, the intake of strontium-90 in food materials was compared with intake from other environmental sources. Intake from environmental sources totalled 1.1 gm. calcium and 15.4 μμc strontium-90 per day or 14.0 strontium units.

Analysis of specific meals (breakfasts and lunches) showed an average intake of 0.260 gm. calcium and 5.0 μμc strontium-90 per meal.

Comparison of observed activity levels of meals with calculated values, based on composition and using activity levels in food types, indicated fair agreement.

Observations of the weekly food intake of two individuals over a rather extensive period showed a median value of 28.4 and 32.0 μμc strontium-90 per week, respectively.

Since the food habits of the general population vary geographically, there is a need for similar studies in other areas.

Although computations have been made specifically for strontium-90, similar computations must be made for other radionuclides contributing to radiation exposure.

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Nutritional Status of Cerebral-Palsied Children[1]

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DIETARY PROGRAMS for cerebral-palsied children generally have been planned to meet the Recommended Dietary Allowances (1) without consideration of the possible effects of physical handicaps on the nutrient needs of the afflicted individuals. Phelps has reported (2) that the energy needs of cerebral-palsied children may differ from those of apparently healthy children since a muscular handicap in a given instance may either increase or decrease physical activity.

Peeks and Lamb studied (3) twenty-nine cerebral-palsied children between the ages of one and fifteen years with respect to the nutritive quality of their dietary intakes. Less than half consumed sufficient calories and calcium to meet 90 per cent of the 1948 Recommended Dietary Allowances and fifteen did not conform to this standard with respect to protein, iron, and ascorbic acid intakes. However, the majority received sufficient vitamin A to meet 90 per cent of the allowances.

From a study of twenty-one cerebral-palsied children, ages four to twenty years, Leamy reported (4) that the quantities of food consumed by eighteen of the subjects did not supply calories in amounts recommended in 1948. In general, the dietary intake of iron was also below the recommendation. The skeletal age of a child was considered to be a better basis for evaluating nutrient intake than chronologic age. This investigator also proposed that a cyclic phenomenon exists in which the disease limits growth and thus caloric intake, and restricted dietary calories limit growth.

These investigations did not employ biochemical measurements of blood components as possible indices of nutritional status. Thus, an attempt was made in the present study to evaluate the nutritional status of group of cerebral-palsied children with respect to past and present dietary intakes and concentrations of hemoglobin, serum ascorbic acid, serum vitamin A, and serum carotene.

Procedure

Twelve cerebral-palsied children in residence at the State University of Iowa Hospital School for Severely Handicapped Children were selected as subjects. It was possible to obtain dietary histories for only eleven by interviews with parents; these were evaluated by reference to a modification of the Basic Seven meal planning guide[2].

Five of the children participated in the experiment from January to May (Group I) and the remaining seven between September and January (Group II). A brief description of the affliction of each child is given in Table 1.

Blood samples were first obtained from each subject on admission to the Hospital School, and then at regular intervals during the same hour of the day throughout the designated periods. Dietary intakes were recorded as estimated portions of food consumed by each child for the two to three days before blood samples were drawn. The standard diet offered to the subjects met the National Research Council recommendations (1) for children of similar ages, but was modified in texture to meet the capacity of the child to eat solid food. Supplementary vitamins were also included in the hospital dietary after the first sample of blood had been collected. Food composition tables (5) were used to determine caloric content, and amounts of protein, iron, vitamin A, and ascorbic acid in the dietaries of these children.

Immediately after the collection of a blood sample, the optical density of a hemolyzed aliquot was measured by the method of Sanford and Sheard (6). Hemoglobin values were calculated from a standard

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[2]Wheat Flour Institute, Chicago.

curve relating optical density readings and hemoglobin concentrations determined from the iron content of blood; iron was measured according to the methods of Wong (7) and Ponder (8). The remainder of the blood sample was allowed to clot. For Group II only, serum ascorbic acid concentrations were measured immediately by a micro-procedure reported by Bessey *et al.* (9). For all subjects, serum was frozen for later determinations of vitamin A and carotene; the micro-method by Bessey *et al.* (10) was used, but standards were dissolved initially in chloroform and the dilutions were prepared in a kerosene-xylene mixture.

Results and Discussion

Dietary histories for eleven of the subjects are summarized in Table 2. Meats and meat substitutes, eggs, whole grain and enriched cereals, and fats were eaten well by the disabled children. Two-thirds of the group consumed the recommended amounts of milk. However, with the exception of citrus fruits, the children did not care for other fruits or for certain vegetables, either because of eating difficulty or actual dislike. Supplementary vitamins were given to these children at home, but not necessarily with predictable regularity. On admission to the Hospital School, such supplements were discontinued until after the first blood sample was taken; then the daily vitamin preparation included in the dietary pattern of the Hospital School was given (Table 3).

Data from repeated two- to three-day dietary intake records of the subjects during the five-month experimental periods are presented in Table 3. Designation of the children into groups is made, since there were seasonal differences between the experimental periods, and the vitamin preparation used in the Hospital School was changed before the second group was admitted. The mean intakes for calories, protein, iron, dietary and supplemental vitamin A and ascorbic acid for each child were compared with the National Research Council (1) recommendations for healthy children of similar ages. All children ate fewer calories than had been recommended for well children. However, 40 to 50 per cent of these calories were supplied by fluid milk, and only two children, PA and JH, had protein intakes which were markedly less than the recommendation. Although this large proportion of milk in the diet provides a liberal supply of calcium, a tendency toward low iron intake might be expected. Ten of the children had mean intakes which did not conform exactly to the dietary allowances for iron. With vitamin supplementation, all received more than the recommended allowances for vitamin A; with one exception, this was true also for ascorbic acid.

TABLE 1 Data on age and afflictions of cerebral palsy in twelve children

SUBJECT	AGE	SEX	AFFLICTION
			Group I
	yr.		
PM	2	M	spastic quadriplegia
DL	6	F	spastic quadriplegia, moderate
LF	6	F	spastic quadriplegia
TP	6	M	athetosis, mild quadriplegia
CF	7	F	spastic quadriplegia
			Group II
BH	4	M	athetosis, hydrocephalous
JH	7	F	athetosis, severe quadriplegia
PA	7	F	spastic quadriplegia, moderate
BM	8	M	spastic quadriplegia, left-hip dislocation
BS	8	F	athetosis, moderate quadriplegia
DH	10	M	spastic quadriplegia, moderate
EG	10	M	athetosis, quadriplegia

The dietary information obtained from this study agrees to some extent with that reported by Peeks and Lamb (3) for cerebral-palsied children studied in Texas. The results of the latter study suggested that, on the basis of 90 per cent of the 1948 Recommended Dietary Allowances, the intakes of calories, protein, iron, and calcium of many of their cerebral-palsied children might be considered to be low. However, only two of the twelve subjects in the present investigation failed to consume 90 per cent of the protein allowance. It is interesting that the average amount of milk ingested by our subjects approximated 1 qt., whereas for the children in the Texas study, the mean was closer to 1 pt.

HEMOGLOBIN

Hemoglobin values and serum concentrations of vitamin A, carotene, and ascorbic acid are presented in Table 4. Means were calculated from values for at least three but no more than five different sampling periods.

The lowest hemoglobin value found was 9.8 gm. per 100 ml. and the highest, 16.2 gm.; the individual means ranged from 11.3 to 15.3 gm. per 100 ml. Hemoglobin values reported for nine-, ten-, and eleven-year-old Iowa school children, who partici-

TABLE 2 Experimental subjects who consumed recommended amounts of basic food groups

FOOD GROUP	NUMBER OF SUBJECTS
Yellow, green and leafy vegetables	4
Citrus fruit, tomatoes, or raw cabbage	10
Other cooked vegetables	7
Potatoes	8
Other fruits and raw vegetables	4
Milk	7
Lean meat and meat substitutes	9
Eggs	9
Whole grain and enriched cereals	10
Butter and margarine	9

pated in a cooperative nutritional status study (11) in the North Central Region, ranged from 11.0 to 15.1 gm. per 100 ml. Eighty per cent of these healthy children had hemoglobin values above 12.0 gm. per 100 ml., whereas 44 per cent had concentrations greater than 13.0 gm. Ten and nine of the twelve cerebral-palsied children had mean hemoglobin concentrations greater than 12.0 and 13.0 gm. per 100 ml., respectively.

Mean hemoglobin concentrations appeared to be lower, generally, for Group II than for Group I. The lowest concentration recorded for each subject in Group II was determined for the sampling which was taken immediately prior to Christmas recess. Results of investigations with young women (12) indicate that some relationship exists between decreased basal hemoglobin values and excitement or fatigue.

TABLE 3 Mean nutrient* consumption calculated from repeated two- to three-day dietary intake records of the experimental children during a five-month period

SUBJECT	CALORIES	PROTEIN	IRON	VITAMIN A	ASCORBIC ACID
			Group I		
		gm./day	*mg./day*	*I.U./day*	*mg./day*
PM	1,100	52	6.9	8,420	71
DL	1,200	44	6.8	7,990	78
LF	1,480	52	7.6	8,320	80
TP	1,430	53	7.0	8,680	80
CF	1,630	56	8.3	9,430	88
			Group II		
BH	1,370	48	9.4	11,420	113
JH	1,060	35	4.8	5,240	58
PA	1,240	45	7.1	8,720	108
BM	1,560	65	9.4	11,520	111
BS	1,490	55	10.3	11,900	179
DH	1,530	78	7.4	9,920	114
EG	1,920	73	10.3	9,620	129

*Values include supplementary vitamins, as follows: Group I—vitamin A, 5,000 I.U.; vitamin D, 1,000 I.U.; ascorbic acid, 50 mg.; thiamine, 1 mg.; riboflavin, 0.8 mg.; niacinamide, 6 mg.; Group II—vitamin A, 5,000 I.U.; vitamin D, 1,000 I.U.; ascorbic acid, 50 mg.; thiamine, 1 mg.; riboflavin, 1.5 mg.; niacinamide, 10 mg.; vitamin B_6, 1 mg.; panthenol, 3 mg.; vitamin B_{12}, 1 mcg.; and biotin, 30 mcg.

SERUM VITAMIN A AND CAROTENE

Serum concentrations of vitamin A ranged from 34 to 163 mcg. per 100 ml. for the cerebral-palsied children, while the means were from 47 to 102 mcg. per 100 ml. Small variations did not seem to be correlated directly with diet. Subject DH had the highest mean serum vitamin A value calculated from four samples; he attained this level when his dietary vitamin A, including the supplement, was greatest. On the other hand, his lowest concentration occurred in the period of second highest intake.

Serum vitamin A values reported (11) for seventy-two Iowa school children between nine and eleven years of age ranged from 15 to 56 mcg. per 100 ml. Only two-thirds of these healthy children had vitamin A values above 30 mcg. per 100 ml., a concentration which has been stated to be indicative of good nutritional status with respect to this particular nutrient (13). All of the cerebral-palsied children had serum concentrations of vitamin A which exceeded this level throughout the experimental periods.

Individual values for serum carotene in the cerebral-palsied children ranged from 51 to 292 mcg. per 100 ml.; the means for Group I were from 86 to 124 mcg. per 100 ml. while those for Group II were between 145 and 281 mcg. per 100 ml. Serum carotene values which ranged from 40 to 367 mcg. per 100 ml. have been reported (11) for 192 Iowa school children between the ages of nine and eleven years, but approximately half of these concentrations were less than 100 mcg. per 100 ml. In the present inves-

TABLE 4 Hemoglobin and serum concentrations of vitamin A, carotene, and ascorbic acid of twelve cerebral-palsied children during a five-month period

SUBJECT	HEMOGLOBIN		VITAMIN A		CAROTENE		ASCORBIC ACID	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
				Group I				
	gm./100 ml.		*mcg./100 ml.*		*mcg./100 ml.*		*mg./100 ml.*	
PM	14.3	13.5—15.4	74	59—88	123	60—188	—	—
DL	14.8	13.8—15.6	76	68—82	124	77—167	—	—
LF	15.3	14.7—15.8	75	62—89	92	64—120	—	—
TP	14.5	13.4—16.2	67	52—86	86	51—177	—	—
CF	14.9	14.5—15.2	66	55—80	91	59—126	—	—
				Group II				
BH	11.7	10.6—12.5	59	52—66	281	266—292	1.35	1.19—1.59
JH	11.3	9.8—12.5	57	34—76	193	127—228	0.85	0.64—1.05
PA	13.7	12.8—14.5	67	55—76	157	131—200	1.24	0.95—1.42
BM	14.1	12.8—15.0	47	36—54	145	136—152	1.90	1.53—2.56
BS	12.7	11.4—13.9	65	55—81	208	144—259	1.45	1.32—1.58
DH	14.4	13.4—15.7	102	54—163	220	180—257	1.66	1.60—1.80
EG	13.5	12.2—15.2	71	51—97	188	87—263	1.32	0.41—1.84

tigation, concentrations of serum carotene less than 100 mcg. per 100 ml. were predominant in Group I; for Group II, the values appeared to reflect the large amounts of carotene present in the summer and early fall food supply which was available immediately prior to and during the experiment.

A summary of reports in literature, published by Robinson (13), suggested that serum carotene values lower than 100 mcg. per 100 ml. are unsatisfactory. According to Stearns (14), it is not uncommon to find serum carotene values below this level, and even as low as 50 mcg. per 100 ml., in Iowa children of this age range, especially during the late winter and early spring months. In general, serum carotene concentrations of young Iowans, which exceed 100 mcg. per 100 ml. during this particular season of the year, have been found only when the family dietary pattern includes ample vegetables and fruits. The staples of the typical Iowan diet are meat, bread, potatoes, and gravy.

As mentioned previously, all of the individual values for vitamin A in the sera of the cerebral-palsied children exceeded 30 mcg. per 100 ml. On the basis of the serum values determined, the intakes of the vitamin and its provitamin were apparently adequate for these experimental subjects. In addition, the need for supplementary vitamin A by all cerebral-palsied children, especially throughout all seasons of the year, may be questioned.

ASCORBIC ACID

Ascorbic acid concentrations in serum were determined for subjects in Group II. Means ranged from 0.85 to 1.90 mg. per 100 ml., and only one individual value was less than 0.6 mg. per 100 ml. The latter concentration was obtained on analysis of the first blood sample from the subject and appeared to reflect the home intake of the vitamin. Subject JH had the lowest mean concentration of ascorbic acid of the group during residence at the Hospital School, and his average intake of the vitamin was also the lowest; these values were 0.85 mg. per 100 ml. and 58 mg., respectively.

From a study of healthy Iowa children between six and fourteen years of age, Eppright *et al.* reported (15) that serum concentrations of ascorbic acid ranged from 0.75 to 1.25 mg. per 100 ml. when the corresponding dietary intakes of the vitamin were between 90 and 137 mg. daily. With intakes of approximately half this range, they found that serum concentrations of ascorbic acid were between 0.57 and 0.81 mg. per 100 ml.

In general, the serum concentrations of ascorbic acid in these cerebral-palsied children reflected dietary intake. Due to the constant use of vitamin preparations at the Hospital School, the quantities of this nutrient received by some of the subjects were greater than the recommended allowances for healthy children of similar ages. However, half of the dietaries would not have met the ascorbic acid allowance if the supplements had been eliminated.

TABLE 5 Height and weight measurements of twelve cerebral-palsied children

SUBJECT	HEIGHT		WEIGHT	
	Initial	After five months	Initial	After five months
	Group I			
	in.	*in.*	*lb.*	*lb.*
PM	36.8	37.0	31.5	35.0
DL	39.2	39.2	33.0	33.0
LF	41.8	41.8	34.0	38.5
TP	40.3	41.0	35.0	39.0
CF	43.8	44.5	36.0	39.5
	Group II			
BH	38.2	39.2	33.5	35.0
JH	38.0	39.2	22.0	22.0
PA	45.8	46.5	46.5	46.5
BM	47.5	48.8	42.0	40.0
BS	47.8	48.5	47.0	50.5
DH	50.5	51.0	61.5	62.0
EG	51.2	52.0	56.0	56.5

Since the biochemical data indicated that the blood concentrations of hemoglobin and the serum values for the vitamins determined were satisfactory, it appears that these children were well nourished with respect to these nutrients. All but one of the cerebral-palsied children either maintained or increased his body height during the study (Table 5). In comparison with healthy Iowa children, as reported by Eppright and Sidwell (16), the cerebral-palsied child was shorter than was the average child of similar age. Furthermore, ten of the experimental subjects were underweight when compared with these healthy children, but not necessarily underweight for height. The results of this study and of those by Peeks and Lamb (3) and Leamy (4) indicate that the Recommended Dietary Allowances for calories with respect to age are not met by many cerebral-palsied children. However, spastics tend to avoid exercise and, in addition, overweight may become a problem in any child with poor muscular control. Rapid weight gain can be a liability to a child with cerebral palsy regardless of the type of affliction. Thus, an intake of calories below the recommendations for the healthy child of similar age may be desirable.

Summary

At regular intervals over a five-month period, hemoglobin and serum concentrations of vitamin A, carotene, and ascorbic acid were determined for twelve cerebral-palsied children between two and ten years of age. The subjects were in residence at a school for severely handicapped children, and dietary records were available.

On the basis of the biochemical findings, the children appeared to be well nourished with respect to the nutrients studied, even though the dietary records indicate that, in several instances, intakes of iron and protein did not meet the Recommended Dietary Allowances for healthy children of corresponding ages. Supplementary vitamin A, which was included in the hospital's dietary plan, might not be needed for each subject throughout all seasons of the year.

The children consumed fewer calories than are recommended by the National Research Council according to their ages. However, it is not suggested that all cerebral-palsied children be urged to increase their caloric intakes.

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The Chemist's View of Coffee Flavor

Recent reports have identified the volatile constituents of coffee aroma as composed largely of aldehydes and sulfides and representing only a few parts per million of the roasted coffee. The isolated essence is a clear, yellow-green liquid that floats on water and has a powerful odor. It evaporates rapidly in room temperature and on oxidation is subject to flavor and aroma deterioration. When sufficiently diluted in air, it gives a true coffee aroma varying with each type of coffee.

Generally, the concentration of volatiles in the coffee bean increases with increased roasting. Various components reach a maximum concentration at different roasting temperatures. The concentrations of volatiles in brewed coffee have been found in the range of only a few to 2000 parts per billion. Here are some of them:

acetaldehyde
acetone
acetyl propionyl
butyraldehyde
carbon disulfide
diacetyl
dimethyl sulfide
ethanol
ethyl formate
furan
hydrogen sulfide
isobutyraldehyde
isoprene
isovaleraldehyde
methanol
methyl acetate
methylbutyraldehyde
methyl ethyl ketone
methyl formate
methylfuran
methyl mercaptan
pentadiene
proprionaldehyde
thiophene

This is but one example of the renewed interest in "finger-printing" the flavor of foods and beverages made possible by the development of such instrumental methods as gas chromatography and mass spectrometry. How fortunate for consumers that the law does not require label declaration of each and every component of food flavors!—*From What's New in Food and Drug Research, Vol. 7, July, 1960.*

Nutrients in Breads from Fourteen Countries[1]

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WHEAT BREADS are important staple foods in many countries. Though it is possible to make breads with whole wheat flour, such breads have usually not been popular in areas where the consumer is able to choose between whole wheat and white breads. For instance, less than 5 per cent of the bread consumed in the United States is whole wheat bread. The bran portion of wheat contains substances which interfere with the leavening so that the resulting loaf of bread is heavy and has a tight structure. Furthermore, whole wheat breads have a relatively strong flavor.

It will be observed that a food must have a mild bland flavor if it is to be consumed in quantity day after day by human beings. Breads made with flours from which the bran and germ layers have been removed are whiter, lighter, and more bland and thus are more acceptable. Over the centuries, millers have striven to produce whiter flours of high extraction rates by separating the white endosperm from the bran and germ. With the advent of the steel roller mill, a 70 per cent extraction flour was produced which contained only trace amounts of bran and germ and which permitted the production of loaves of bread with mild flavor and fine texture. Ordinary white bread is nutritionally inferior to whole wheat bread because significant amounts of certain nutrients were removed during the milling of white flour. The more critical of these (thiamine, riboflavin, niacin, iron, calcium, and vitamin D) are added to the flour or the dough in the production of enriched white bread in the United States and elsewhere (1). Furthermore, today's enriched white bread contains significant amounts of nonfat milk solids which further enhance its nutritional value. It may be questioned, nevertheless, whether our modern enriched white bread is nutritionally equal to whole wheat bread.

The nutrient content of a loaf of bread is determined primarily by the ingredients used in its preparation: the variety of wheat, degree of refinement, presence of other cereals (rye, oats, barley, corn), use of non-cereal materials (milk solids, lactalbumen, and so on) and enrichment nutrients (vitamins, minerals, amino acids), and the conditions of baking. Because thousands of recipes are used today in producing the breads of the world, it would be necessary to analyze hundreds of samples before it would be possible to know with accuracy the composition of the breads of the world.

This modest study was undertaken to get a rough approximation of the nutrient content of *typical* breads from those countries where bread is an important item in the daily diet. The forty-four samples taken from fourteen countries in this spot survey were representative of the popular breads in these counties. Though it is likely that more nutritious breads are produced in each of these countries, these breads are not sufficiently popular to be considered typical.

Procedure

Most of the samples of bread were purchased in the retail market. They were sliced, air-dried at room temperature for approximately 24 hr. in the absence of light, pulverized, and shipped by air express to Massachusetts Institute of Technology. All samples were kept in frozen storage until analyzed, usually within a few days after receipt. Because most samples were not collected from the bakery, the ingredients were not always known. The quantities of nutrients known to be used in these forty-four bread samples are listed in Table 1 under the following six categories: white wheat breads, enriched;

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TABLE 1 **Description of bread samples**

SAMPLE NUMBER	ORIGIN OF SAMPLE	DATA ON FLOURS*				OTHER INGREDIENTS‡				LOCAL NAME: PROCESS: OTHER COMMENTS OR INFORMATION
		Extraction rate	Ash†	Type of flour†	Ratio of flours*	Nonfat milk solids#	Yeast	Salt	Miscellaneous	
	White Wheat Breads, Enriched									
		%	%			%	%	%	%	
1	Sydney, Australia	72						2	16 (wheat gluten) 2 (shortening)	4-hr. straight dough; U.S. enrichment standard
2	London, England	72								available throughout country
3	London, N.W., England	72								
4	Manila, Philippines	70-72								*Pan americano*
5	Manila, Philippines	70-72								*Pan de Limon*
6	Manila, Philippines	70-72								*Pan de Sal*
7	Stockholm, Sweden	72				5	3.8	1.3	22 (shortening)	*Loff*
8	Zurich, Switzerland	70				0	1	2.3		*Ticino* or *Tessinerbrot*
9	Boston, Mass.	70				4				representative of over 60% of commercial breads in U.S.
	White Wheat Breads, Not Enriched									
10	Sydney, Australia	72								
11	Sydney, Australia	72								roll
12	Vienna, Austria	62		710						
13	Havana, Cuba	72					0.75		3 (lard)	*Pan de manteca;* representative of 80% of bread consumed in country
14	Havana, Cuba	72				3	1.5			*Pan de molde de leche;* a premium bread
15	Havana, Cuba	72					2		10 (lard)	*Galletas de sal;* popular in island interior
16	Havana, Cuba	72					0.75			*Pan de flauta de agua*
17	Helsinki, Finland		0.54			6	3	2		French-type; sponge dough method used, baked at 200°C.
18	Helsinki, Finland		0.54			8	2	1.1		French-type; baked at 200° C. in steam oven
19	Paris, France	75					0.6	1.7		first proofing 240 min., second proofing 45 min.
20	Paris, France	72				1.6	0.7	1.8		Viennese-type; proofed for 270 min., and 45 min.
21	Grenzach, Germany	70		550						
22	Milan, Italy	72					2	0.7		*Pane emiliano*
23	Bologna, Italy	75					2.5	0.9		*Pane comune*
24	Bologna, Italy	58					4.1	0.9	7 (shortening)	*Pane de lusso condito*
25	Basle, Switzerland	65-70				0	1.25	2.6		*Weissbrot*
	Semi-White Wheat Breads, Enriched									
26	Copenhagen, Denmark	78				1.0	2	0.7		*Frankskrod*
27	Stockholm, Sweden	72			3/5		4	1.5	2.3 (shortening)	
		100			2/5				5.7 (raisins)	
28	Berne, Switzerland	77					0.75	2.4		*Halbweissbrot*
	Semi-White Wheat Breads, Not Enriched									
29	Helsinki, Finland	92	1.4		10/11	4.3		1.5		straight dough method; baked at 220°C.
		100			1/11					
30	Helsinki, Finland	92	1.4		4/5	4	3	2		straight dough method; baked at 220°C
		100			1/5					
31	Oslo, Norway	80				2	1.7	1.5	3 (shortening)	
32	Oslo, Norway	80			5/7		3	2		
		100			2/7					
33	Basle, Switzerland	77					0.75	2.5		
34	Basle, Switzerland	87					0.75	2.3		*Ruchbrot*
	Wheat-Rye Breads									
35	Vienna Austria	76 (rye)		1000	7/10					
		96 (wheat)		1600	3/10					
36	Vienna, Austria	92 (rye)		1600	9/10					
		82 (wheat)		1000	1/10					
37	Copenhagen, Denmark	69 (rye)			1/2		2	1.5		*Maltet sigtebrod*
		78 (wheat)			1/2					
38	Helsinki, Finland	100 (rye)			4/5		1	1		soured overnight at 25°C., fermented 1 hr. baked at 230°C.
		92 (wheat)	1.4		1/5					
39	Grenzach, Germany	80 (rye)		1150	1/6					
		78 (wheat)		812	2/6					
		83 (wheat)		1050	2/6					
		92 (wheat)		1600	1/6					
40	Grenzach, Germany	85 (rye)		1370	2/3					
		92 (wheat)		1600	1/3					
41	Oslo, Norway	100 (rye)			3/4			1		
		80 (wheat)			1/4					
42	Stockholm, Sweden	72 (rye)			2/5		2.6	1.1	11 (molasses)	*Vort limpa*
		58-70 (wheat)			3/5				0.5 (anise) 0.8 (shortening)	
	Rye Breads									
43	Copenhagen, Denmark	100 (rye)						9		*Morkt mallet rugbrod*
44	Helsinki, Finland	100 (rye)			7/8		1	1		sour dough; baked at 230-240°C.
		92 (wheat)	1.4		1/8					

*Extraction rate refers to percentage of wheat kernel retained in the flour. In some countries, the degree of refinement is expressed by "type" or in terms of "per cent ash content." When more than one type of flour was used, the ratios of each are given.
†In Europe, the per cent ash content × 1000 = type. Flours of lower extraction rates contain less ash.
‡Most of the samples were collected at retail and the exact formulas are not known.
#Though liquid milk was used in several formulas, all milk values are expressed here on an anhydrous basis to permit comparison.

white wheat breads, not enriched; semi-white wheat breads, enriched; semi-white wheat breads, not enriched; wheat-rye breads; and rye breads.

Each analysis was carried out in at least two of the five laboratories[2] participating in this study.

The moisture, ether extract, fiber, ash, riboflavin (fluorometric), and calcium content were determined according to the methods of the Association of Official Agricultural Chemists (2); phosphorus by the method of Lowry and Lopez (3); iron by the colorimetric method of Hahn (4); nitrogen according to Hamilton and Simpson (5); ascorbic acid according to Roe and Oesterling (6); thiamine according to the Moyer and Tressler modification (7) of the Hennessy and Cerecedo thiochrome procedure (8); tryptophan according to Greene and Black (9) as modified by Schweigert and Snell (10); lysine and methionine by the method of Steele *et al.* (11); vitamin B_{12} and niacin (using *L. arabinosus* 17-5) according to USP XIV (12); vitamin B_6 according to Atkin *et al.* (13); and calcium pantothenate by the microbiologic *L. arabinosus* 17-5) method of Toepfer *et al.* (14), after extraction with Mylase P (15).

The averages of results of these analyses are presented in Table 2. Because moisture of the bread samples varied considerably and because it was desirable to compare the nutrient contents of the various breads, the data are presented on the anhydrous basis.

Discussion

COMPARISON ACCORDING TO NUTRIENTS

The ranges of values were as follows: ash, 1.5 to 3.9 per cent; fat, 1.4 to 12.5 per cent; protein, 8.4 to 16.0 per cent; calcium, 27.9 to 249 mg. per 100 gm.; phosphorus, 54 to 444 mg. per 100 gm.; iron, 1.0 to 7.8 mg. per 100 gm.; thiamine, 0.07 to 0.74 mg. per 100 gm.; riboflavin, 0.06 to 0.63 mg. per 100 gm.; niacin, 0.7 to 4.8 mg. per 100 gm.; calcium pantothenate, 0.2 to 0.9 mg. per 100 gm.; vitamin B_6, 0.07 to 0.40 mg. per 100 gm.; lysine, 201 to 460 mg. per 100 gm.; tryptophan, 49 to 170 mg. per 100 gm.; and methionine, 99 to 214 mg. per 100 gm. In all cases, the vitamin B_{12} assays were negative, indicating less than 0.34 mcg. vitamin B_{12} per 100 gm., dry basis.

Breads made with the high extraction flours generally contained more ash and phosphorus, and often more protein, vitamin B_6, and amino acids. The breads containing milk (samples No. 7, 9, 14, 17, 18, 20, 26, 29, 30, and 31) generally contained more calcium, riboflavin, and protein (amino acids) than other breads in the same class. It is likely that milk was used in some of the other samples. The use of enrichment (samples No. 1 to 9, 26, 27, 28, 37, and 42) increased the thiamine, niacin, and iron, and sometimes the riboflavin, content of the white bread samples. It is evident from the calcium values that calcium salts (or milk) were added to the formulas of samples No. 2, 3, 12, 17, 18, 20, 26, and 43.

COMPARISON ACCORDING TO BREAD SAMPLES

The enriched white breads were generally superior to the unenriched and semi-white or mixed breads, especially in content of calcium, iron, thiamine, riboflavin, niacin, but inferior to these less refined breads in vitamin B_6 content. Low extraction flour contains about 20 to 35 per cent as much vitamin B_6 as whole wheat flour (0.12 to 0.26 vs. 0.38 to 0.60 mg. per 100 gm.) (1). The use of milk powder in white bread formulas does not improve the vitamin B_6 content significantly, for milk powder contains only 0.33 to 0.48 mg. per 100 gm. (1), and relatively little milk is used in the bread formulas. The chief nutritional weakness of enriched white bread in comparison with whole wheat bread types appears to be in vitamin B_6 content.

Since all nutrients are equally essential in the nutrition of human beings, each was given equal importance in calculating the relative "over-all nutritional ratings" of these breads. All the data in Table 2, except moisture, ash, and nitrogen, were used in these calculations. The data for fat and carbohydrate were combined to determine the caloric rating of each bread. The calcium: phosphorus ratio of each bread was used as one of the criteria, instead of the phosphorus ranking. Ratings of 1 to 44 were given to the breads according to the highest to lowest amount of each nutrient per 100 gm. dry weight. The fourteen rankings of each bread were then averaged, and the bread with the lowest average value was judged to have the best "over-all nutritional rating." The results of this calculation are shown in the last column of Table 2.

It will be noted that the compositions of the enriched white breads varied considerably, mainly because the standards of enrichment are not the same in each country (1). Those samples (No. 1, 4, 5, 6, and 9) which had been enriched according to United States standards had a higher nutritive rating than the samples of enriched white breads from other countries.

By this rating procedure, it is evident that the bread with the highest over-all nutritional value was a semi-white Finnish bread (No. 29) made with a mixture of whole wheat and white flour and 4.3 per cent milk solids. The high phosphorus content of this bread indicates that it contained considerable

[2]The cooperation of the five laboratories which collaborated in this study is deeply appreciated. These laboratories were: Laboratorios FIM de Nutrición, Havana, Cuba; General Baking Company, New York, New York; Hoffmann-LaRoche, Inc., Nutley, New Jersey; Food and Drug Research Laboratories, Inc., Maspeth, New York; and Nutritional Biochemistry Laboratories, Massachusetts Institute of Technology, Cambridge.

TABLE 2 **Nutrient content of breads (expressed on anhydrous basis)**

SAMPLE NUMBER	COUNTRY OF ORIGIN	INITIAL MOISTURE	ASH	FAT	NITROGEN*	PROTEIN*	CARBOHYDRATE†	CALCIUM	PHOSPHORUS	IRON	THIAMINE	RIBOFLAVIN	NIACIN	CALCIUM PANTOTHENATE	VITAMIN B_6	LYSINE	TRYPTOPHAN	METHIONINE	OVER-ALL NUTRITIONAL RATING
		%	%	%	%	%	%	← mg./100 gm. →											
White Wheat Breads, Enriched																			
1	Australia	33.4	2.7	2.1	2.1	11.9	83.3	50.1	116	6.2	.42	.28	4.7	.3	.11	201	140	150	9
2	England	38.4	2.6	2	2	11.2	84.2	160	164	4.8	.24	.06	2.1	.4	.07	290	170	160	17
3	England	35.9	2.7	2.3	2	11.2	84.8	110	120	3.2	.20	.06	1.7	.3	.09	260	170	160	29
4	Philippines	32	1.6	7.4	2.3	13.1	77.9	59	122	3.9	.37	.15	2.9	.5	.07	322	141	172	11
5	Philippines	28	1.5	5.7	2.2	12.5	80.3	27.9	124	2.4	.50	.18	4.3	.5	.09	310	162	185	12
6	Philippines	24	1.9	2.8	1.8	10.3	85	47.2	118	5.1	.45	.19	3.9	.5	.11	293	130	169	6
7	Sweden	37	2.1	3.7	2.1	11.9	82.3	73.7	126	4.5	.35	.25	4.8	.5	.09	241	101	114	19
8	Switzerland	33.5	1.9	12	1.9	10.7	76.4	44.5	102	2.5	.42	.25	3.5	.5	.07	310	120	165	21
9	United States	35.4	3	5	2.4	13.7	78.3	50	114	3.4	.40	.28	4	.9	.09	337	98	175	2
White Wheat Breads, Not Enriched																			
10	Australia	33	2.4	3	2.4	13.7	80.9	45.4	123	5.1	.18	.15	1.9	.4	.12	213	83	147	33
11	Australia	31.5	2.8	2.1	2.2	12.5	82.6	34.7	124	4.2	.16	.14	1.4	.4	.11	226	57	153	36
12	Austria	38	2.7	1.8	2.2	12.5	83	155	175	2.2	.23	.10	2.2	.5	.15	282	65	138	31
13	Cuba		1.7	6.9	2.7	15.4	76	44.5	180	1.2	.10	.21	2.7		.36	403	163	199	13
14	Cuba		1.7	7.6	2.8	16	74.7	42	147	1.4	.07	.63	2		.18	359	166	214	20
15	Cuba		2.3	12.5	2.6	14.8	70.4	40.8	129	2.7	.08	.07	1.8	.3	.10	347	143	196	32
16	Cuba		2	6.3	2.8	15.9	75.8	51.4	137	2.4	.22	.08	1.8	.4	.10	326	156	209	25
17	Finland	38	2	2.1	2.5	14.4	81.5	108	175	7.8	.21	.14	3	.8	.13	240	103	137	24
18	Finland	38	2.1	1.5	2.4	13.7	82.7	100	180	1.5	.14	.16	1.4	.6	.13	431	98	196	27
19	France	32	2.3	1.5	1.7	9.7	86.5	61.7	81	1.4	.07	.12	0.8	.2	.07	221	54	111	44
20	France	28.5	2.6	1.4	1.8	10.2	85.8	86.7	95	1	.09	.10	1	.3	.09	227	83	141	40
21	Germany	37.4	2.1	1.6	2	11.4	84.9	47.4	106	1.8	.19	.08	1.4	.4	.12	238	170	147	35
22	Italy	36	1.9	4.3	1.8	10.3	83.5	37.9	121	3.1	.15	.06	0.7	.2	.08	239	107	132	43
23	Italy		2	2.1	1.8	10.3	85.6	39.9	129	2.3	.14	.14	1.6	.3	.09	213	100	127	42
24	Italy		1.9	4.8	1.8	10.3	83	31.6	106	2.3	.09	.18	1.5	.3	.09	245	99	123	38
25	Switzerland	32	2.9	1.6	2.2	12.5	83	36.8	54	2	.07	.09	1.1	.3	.07	279	117	145	41
Semi-White Wheat Breads, Enriched																			
26	Denmark	44.6	2.2	1.8	1.4	8.4	87.6	249	119	2.7	.50	.44	1.3	.4	.15	244	81	120	28
27	Sweden	36	2.4	4.6	1.8	10.3	82.7	40.5	178	4.4	.32	.19	4.2	.5	.14	277	125	125	22
28	Switzerland	33.5	3.1	2.8	2.4	13.5	80.6	75.5	172	3.8	.74	.37	4.8	.5	.19	304	110	152	3
Semi-White Wheat Breads, Not Enriched																			
29	Finland	38	2.9	3.1	2.8	16	78	81.5	348	3.5	.58	.20	3.4	.7	.32	460	141	213	1
30	Finland	38	3.0	3.4	2.7	15.9	77.7	93	338	4.4	.25	.20	4.1	.9	.24	286	82	159	5
31	Norway	35	2.3	4	2.5	14.2	79.5	86.4	212	2.1	.19	.14	2.4	.7	.15	312	160	186	16
32	Norway	37.2	2.7	2.8	2.3	13.2	81.3	43.4	330	3.4	.27	.17	4.1	.5	.29	312	76	169	18
33	Switzerland	31.2	3.2	2.6	2.4	13.7	80.5	50.3	156	2.4	.18	.11	1.8	.4	.12	350	146	169	23
34	Switzerland	37.2	3.9	2.5	2.4	13.7	79.9	53.2	242	3.3	.30	.16	2.9	.5	.21	352	163	173	4
Wheat-Rye Breads																			
35	Austria	41	3.2	1.9	1.8	10.3	84.6	43.2	246	3.1	.30	.10	1.4	.2	.20	255	102	122	37
36	Austria	45	3	1.7	1.6	9.1	86.2	39.3	204	2.5	.26	.10	1.1	.2	.17	250	116	99	39
37	Denmark	39.1	3.5	3	2.2	12.5	81	64	444	2.9	.43	.28	0.8	.5	.13	399	122	145	15
38	Finland	41	3	2.3	2.2	12.5	82.2	52.7	373	4.3	.33	.17	1.4	.4	.30	410	78	143	14
39	Germany	38	2.8	2.1	2.1	11.9	83.2	68.2	233	2.3	.28	.10	2.4	.4	.19	284	95	147	30
40	Germany	36.9	2.8	2.7	2.2	12.5	82	73.8	323	3	.42	.17	3.9	.5	.25	350	111	177	7
41	Norway	37	1.9	2.2	2.1	11.9	84	33.2	207	3	.21	.11	4.4	.8	.15	283	49	138	34
42	Sweden	35	1.9	2.3	1.7	9.7	86.1	41.8	121	2.6	.24	.18	2.3	.4	.10	348	138	156	26
Rye Breads																			
43	Denmark	42	1.8	3	2.1	11.9	83.3	242	145	3.3	.35	.21	1.6	.6	.40	280	127	149	8
44	Finland	40	3.2	3.1	1.9	11.1	82.6	52.3	336	4.8	.26	.21	2.5	.5	.27	253	116	121	10

*N×5.7

†Calculated by difference

bran or germ, and the very high protein suggests that the flour was either high in gluten, wheat germ, or some other protein-rich ingredient.

The bread which ranked second in over-all nutritional value was the enriched white bread (No. 9) typical of that sold in the United States. Made with 70 per cent extraction flour and 4 per cent milk solids, it was enriched with thiamine, riboflavin, niacin, and iron according to United States standards. It seems clear, then, that the enriched white bread

of the United States, which represents about 80 per cent of all bread consumed, is excellent in nutritional value and compares favorably with the breads of the world.

Third ranking was given to a semi-white enriched bread from Switzerland (No. 28) which was made with 77 per cent extraction flour. Fourth place was earned by another bread from Switzerland (No. 34) made with 90 per cent extraction flour. Fifth ranked was a semi-white milk bread (No. 30) from Finland.

On the basis of the few bread samples included in this spot survey, it is interesting that of the six types of bread studied, the white breads enriched according to United States standards ranked first, rye breads second, semi-white breads third and fourth, mixed wheat-rye breads fifth, and unenriched white breads sixth. Thus, the over-all nutritional rating of white bread has been raised from the poorest to the best by the addition of several critical nutrients, and at very low cost to the consumer.

The nutritional value of enriched bread might be improved still further, and serious consideration should be given to the advisability and feasibility of including such nutrients as lysine, vitamin B_6 (pyridoxine), vitamin B_{12}, and essential fatty acids in the enrichment formula.

Summary and Conclusions

The nutrient composition of forty-four samples of typical breads collected from fourteen countries was studied by chemical, microbiologic, and fluorometric methods.

These breads showed considerable variation in nutrient content due to: (a) variety of wheat or rye, (b) blending of wheat and rye flours, (c) extraction ratios of the flours, (d) the use of milk solids and other protein sources and (e) addition of enrichment nutrients.

The breads highest in over-all nutrient content were: (a) semi-white milk bread from Finland, (b) enriched white bread from the United States, (c) two semi-white breads from Switzerland, and (d) semi-white bread from Finland. According to type of bread, the enriched white breads which complied with United States enrichment standards ranked highest in over-all nutrient content, rye bread second, semi-white breads third and fourth, mixed wheat-rye bread fifth, and unenriched white bread lowest. Thus, the enrichment formula used in the United States is effective in raising the nutrient content of white bread from the lowest rating, so that it now compares favorably with the breads of the world.

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Vitamin Seizures Due to False Claims

The Food and Drug Administration reports two seizures during August 1960 involving almost 9 million capsules of vitamin products valued at more than $41,000. In each case, promotional material, including labeling brochures and/or reprints from newspaper and magazine articles, were also confiscated.

Another seizure of Honegar (see July 1960 JOURNAL, page 31) was made in Houston, which included 700 copies of the best-seller, *Folk Medicine* by D. C. Jarvis. As displayed in proximity to the product, it is alleged that the book constitutes false and misleading labeling.

Fruits and Vegetables— How Do Meal Planners Feel about and Use Them?[1]

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FRUITS AND VEGETABLES are an important part of the family's diet from the standpoint of nutritive value as well as palatability. Many factors affect the choices of specific fruits and vegetables and the characteristics which meal planners consider important in purchasing them. Food attitudes of family members are conditioned by such factors as: their likes and dislikes for particular foods which, in part, are culturally determined; money available for food; the meal planner's knowledge of the nutritive values of foods; the time she spends in shopping and meal preparation; and the household equipment available for preparing and storing foods. In general, limited factual information is to be found in the literature concerning families' attitudes and use of fruits and vegetables and of the specific factors which influence their attitudes and use.

Studies, however, have been made of consumers' attitudes and usages of specific fruits and vegetables—potatoes (1-3), avocados (4), citrus products (4-6), and peaches (7), to mention only a few. More comprehensive studies have been concerned with fresh and processed fruits and vegetables—selected fresh fruits and vegetables (8), selected frozen products (9), and canned and frozen products (10). In addition, some of these studies have represented different groups in a specified population—two age groups in a state (8), all households in specified cities or counties (5), and a cross-section of households in cities of 2500 and over (3).

There appears to be no investigation of attitudes toward and use of fresh, canned, frozen, and dried fruits and vegetables of a representative sample of households in a specified county. This study was concerned with such an investigation.

It was conducted to obtain the following information: (a) the frequency of serving fruits and vegetables to household members at breakfast, lunch, and dinner; (b) the extent of use by meal planners of fresh, canned, frozen, and dried fruits and vegetables for specified purposes; (c) homemakers' preferences for various quality characteristics of fresh fruits and vegetables; (d) meal planners' opinions about specified factors when purchasing fresh and frozen products; (e) their attitudes concerning the nutritional level, quality, convenience in preparation, and relative cost of fresh, canned, frozen, and dried products; and (f) some shopping practices of meal planners.

Such information should be particularly useful to nutritionists, dietitians, teachers, Extension personnel, and public health workers. It will be presented in four papers; this paper, the first of the series, presents the methodology, the characteristics of the households interviewed, the relationships between these characteristics, and the effect of family income and size on food expenditures.

Methodology

This survey was conducted in Butte County, California during June through early September, 1959. The personal interview method was used to obtain the data. Interviewers were trained at the University of California, Davis, and lived in the county during the survey. A pretested, closed-end questionnaire of 8 pages and 182 questions was used.

Since the country contained both urban and rural areas, the telephone subscribers were used for sampling purposes. The telephone company provided an

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TABLE 1 Characteristics of 680 households

CHARACTERISTIC	PERCENTAGE
Annual Family Income	
Under $2,500	15
$2,500 to $5,000	34
$5,000 to $7,500	30
$7,500 to $10,000	13
$10,000 and over	8
Family Size	
2 persons	37
3 persons	18
4 persons	22
5 persons	14
6 or more persons	9
Place of Residence of Family	
Urban	39
Rural non-farm	56
Rural farm	5
Educational Background of Wife	
No formal schooling	*
Elementary school, 1 to 7 years	6
Elementary school, 8 years	11
High school, 1 to 3 years	17
High school, 4 years	40
College, 1 to 3 years	16
College, 4 years	7
College, more than 4 years	3
Age of Wife	
Under 30 years	13
30 to 50 years	52
Over 50 years	35
Employment Status of Wife	
Full-time	24
Part-time	9
Not employed	67

*Less than half of 1%.

up-to-date listing of subscribers as of May 1959 for the selection of the sample. An original list of 5 per cent of the households in the county was selected at random from this list, business and other organizations having been eliminated before the sample was drawn. Substitute lists also were selected on a 5 per cent random basis. It was estimated that over four-fifths of the households in the county had telephone service.

To be eligible for interviewing, the household had to contain two or more persons related by blood, marriage, or adoption. In other words, the terms "household" and "family" were synonymous in this study. A household was ineligible unless two members of the family each usually ate a minimum of ten meals at home each week. It was also ineligible if five or more boarders ate with the family, since this was considered a boarding house rather than a family unit. The person interviewed must have been the food buyer as well as the meal planner. Substitute households were used only if the meal planner was not reached after two calls, at least one of which was made in the evening or during the weekend.

TABLE 2 Occupation of male head of household

OCCUPATIONAL CATEGORY	PERCENTAGE
Professional, technical	13
Managers, officials, and proprietors, except farm	15
Craftsmen, foremen	18
Operatives	10
Laborers, except farm	4
Clerical	5
Sales	8
Service workers	3
Farmers and farm managers	6
Farm laborers and foremen	1
Retired	17

A total of 1153 households was contacted. Completed interviews were obtained from 680; 204 households were ineligible; 89 homemakers declined to participate; and no contact could be made with meal planners in 180 households. The people were unusually cooperative; the refusal rate of 8 per cent of all households contacted is low for surveys of this type. The most frequent reasons given for refusal were illness in the family, getting ready to go on vacation, and "too busy today." If the meal planner was too busy the day the interviewer called, it was sometimes possible to make an appointment for some future date, thereby transferring a refusal to a completed interview.

Analysis of the Data

The data were analyzed not only for the 680 households but also for six classifications based on selected characteristics of the households. These were: annual family income, family size, family's place of residence, homemaker's educational background, her age, and her employment status. Table 1 presents the characteristics of the 680 households for each classification.

FAMILY INCOME

The annual family income included total income for 1958 before federal income taxes from earnings, dividends, interest, rents, pensions, insurance, annuities, and so on. No attempt was made to compare the information obtained for this or for any of the other classifications with the 1950 Census information for Butte County because of the changes in the total population as well as in the characteristics of this population which had occurred in the interim.

To provide insights into the distribution of family income, Table 2, which gives the occupation of the male head of the household, was compiled. The occupational categories were the same as those used in the Census (11), except for the addition of the category "retired." The relatively high percentage in the lower income groups may, in part, be explained by the large percentage of retired people in the county who maintain their own households.

FAMILY SIZE

To obtain the family size of each household, only those members who usually lived in the family group for eight months or more of the year were included. If children attended college away from home during the school year, they were not included, even though they might have been present at the time of the interview. The average number of family members per household was 3.5 persons.

Of the 680 families, 94 per cent contained both husband and wife, 5 per cent contained mother only and children, 1 per cent contained other relatives living together, and less than half of 1 per cent contained father only and children. Of the husband-wife families, 49 per cent had children of preschool age or attending elementary or high school, while 4 per cent had both children and adult offspring (those no longer attending high school). In 36 per cent of the husband-wife families, no children were present.

FAMILY'S PLACE OF RESIDENCE

Using Census definitions (12), the households were grouped by urban, rural non-farm, and rural farm areas. For Butte County, with an estimated 1958 total population of 72,300, with 14,687 for its largest town, Chico, urban places were those having a population of 2,500 or more, either incorporated or unincorporated. The rural farm population comprised all rural residents living on farms, while the rural non-farm population consisted of the remaining rural population. As was to be expected, the majority of households were located in rural non-farm areas.

HOMEMAKER'S EDUCATION

In analyzing the data, the term "wife" was used to signify wife and/or mother. Such a person resided in 99 per cent of the households surveyed.

According to the Census estimate (13) of the female civilian population eighteen years of age and over who reported their years of schooling in 1959, 31 per cent had one to eight years of elementary schooling, 52 per cent had one to four years of high school, 15 per cent had one or more years of college, and 2 per cent had no formal schooling.

Compared with all women in the country, a much smaller proportion of wives in Butte County had elementary school training only and a much larger proportion college training. Only one-sixth of the sample had from one to eight years of elementary school, but one-fourth had one or more years of college while the remainder, about three-fifths, had one to four years of high school.

It is interesting that the wives resented answering only the question on schooling, whereas the question usually resented pertains to family income. The fact that Chico State College was located in Butte County may, in part, explain this attitude.

TABLE 3 Significance of relationships between six classifications

COMPARISONS	SIGNIFICANCE
Wife's education and wife's age	.1% level
Wife's education and family income	.1% level
Wife's education and family size	.1% level
Wife's education and family's place of residence	.1% level
Wife's education and wife's employment status	1% level
Wife's age and family income	.1% level
Wife's age and family size	.1% level
Wife's age and family's place of residence	not significant
Wife's age and wife's employment status	.1% level
Family income and family size	.1% level
Family income and family's place of residence	5% level
Family income and wife's employment status	1% level
Family size and family's place of residence	not significant
Family size and wife's employment status	not significant
Family's place of residence and wife's employment status	not significant

None of the wives, however, refused to answer the question.

WIFE'S AGE

The majority of wives were in the median group, thirty to fifty years of age. About one-third were in the relatively older group, over fifty years of age, and the remainder, about one-eighth, were in the relatively younger group, under thirty years of age. A comparison with the latest Census estimate (14) of all married women in the 1958 civilian population indicated that the proportions in the median age range were about the same as in this study. However, the proportions in the older range were higher and in the younger range lower for the wives in Butte County than for all married women in the United States.

WIFE'S EMPLOYMENT STATUS

Two-thirds of the wives were not employed; this proportion was about the same as that for all married American women in the country in 1959 (15). About one-fourth of the wives were employed full-time, as contrasted with one-tenth who were employed part-time.

Of the employed, 24 per cent were in the professional and technical category and another 24 per cent in the clerical category. Sixteen per cent were classified in the laborers-except-farm category; they worked primarily in canneries. In addition, 11 per cent were in the category of managers, officials, and proprietors except farm; women in this category were primarily proprietors.

Relationships between the Classifications

Table 3 presents the significance of the relation-

TABLE 4 Money spent weekly for all food and for all fruits and vegetables for home use, according to family income

WEEKLY FOOD EXPENSE	PER CENT OF HOUSEHOLDS			
	Income under $2,500	Income $2,500 to $4,999	Income $5,000 to $7,499	Income $7,500 and over
All Food				
Less than $10	11	1	1	0
$10 to $14.99	35	13	6	4
$15 to $19.99	30*	20	14	10
$20 to $24.99	12	29*	18	14
$25 to $29.99	7	19	27*	29*
$30 to $34.99	3	9	15	13
$35 to $39.99	2	4	9	11
$40 or more	0	5	10	19
All Fruits and Vegetables				
Less than $2	29	7	2	1
$2 to $3.99	34*	25	18	14
$4 to $5.99	26	33*	26	24
$6 to $7.99	7	18	27*	24*
$8 to $9.99	4	10	14	20
$10 to $14.99	0	5	10	14
$15 or more	0	2	3	3

*Median expenditure.

TABLE 5 Money spent weekly for all food and for all fruits and vegetables for home use, according to family size

WEEKLY FOOD EXPENSE	PER CENT OF HOUSEHOLDS				
	2 persons	3 persons	4 persons	5 persons	6 persons or more
All Food					
Less than $10	5	1	1	1	2
$10 to $14.99	28	5	2	2	0
$15 to $19.99	31*	17	12	4	5
$20 to $24.99	21	31*	18	16	8
$25 to $29.99	11	25	36*	26	16
$30 to $34.99	2	9	18	20*	16
$35 to $39.99	1	7	9	13	12*
$40 or more	1	5	4	18	41
All Fruits and Vegetables					
Less than $2	16	2	3	3	2
$2 to $3.99	36*	18	11	10	13
$4 to $5.99	29	38*	27	23	18
$6 to $7.99	13	25	33*	19*	16
$8 to $9.99	4	9	18	23	21*
$10 to $14.99	2	6	7	15	25
$15 or more	0	2	1	7	5

*Median expenditure.

ships between the six classifications. The wife's education was highly significant when related to the other five classifications. For example, 72 per cent of all wives having elementary school training were in two-person families. Therefore, this meant that, if data on the times vegetables were served at dinner were found significant for the two classifications and if, in addition, those with elementary school training were found to place more emphasis on the daily serving of vegetables than those with high school or college training, then the data for family size should show that two-person families also emphasized daily serving of vegetables more than larger families if the findings were to be consistent and, hence, reliable.

Only four relationships were not significant at the 5 per cent or higher level; these were: between family's place of residence and each of the three classifications of wife's age, family income, and wife's employment status. Neither was the relationship significant between the two last mentioned classifications. All of the relationships, except for that between family income and wife's employment status, will be discussed in later papers in this series.

Expenditures Related to Income and Family Size

Relationships between food expenditures and income as well as those between food expenditures and family size could be expected to indicate the reliability of the meal planners' responses. It was to be expected that the question on annual family income, as well as questions on expenditures for all food and for fruits and vegetables, would be the most difficult to answer. If the responses to these questions were reasonable, then the meal planners' responses to the other questions likely would accurately reflect their attitudes and practices.

Table 4 presents information concerning the weekly amount spent for all food when the data were classified on the basis of family income as well as the same information for all fruits and vegetables. There was a pronounced tendency for the weekly expenses for all food as well as for fruits and vegetables to increase as family income increased. The same pronounced tendency existed for family size, that is, expenses increased as family size increased (Table 5).

Economic theory assumes that relationships between expenditures for food and for either family income or family size will be of this nature. Consequently, since the relationships based on information supplied by meal planners were consistent with those to be expected, it appears likely that the information concerning expenditures and income was reliable.

The remaining three papers in this series will be concerned with: (a) the frequency of serving fruits and vegetables and of using fresh and processed products for specified purposes; (b) the importance attached to various quality characteristics and purchase factors of fruits and vegetables; and (c) the extent to which fresh and processed products were considered to be most nutritious, most convenient to prepare, most and least costly per serving, and of the highest quality, and, in addition, a description of purchasing practices for these fresh and processed products.

Summary

The selection of the sample and the characteristics of the households in terms of income, family size, place of residence, and wife's age, educational level, and employment status were described. In addition, the relationships between these characteristics as well as those between food expenditures and family income and family size were presented.

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Two Weeks in a Family Shelter

A recent issue of *Women in Civil Defense,* which is published by the Office of Civil and Defense Mobilization, carried an account of a family's experience during two weeks spent in a simulated fallout shelter. The family, the Thomas A. Powners, included the husband, wife, and three small children. Mrs. Powner described the experience as being "like spending fourteen consecutive rainy days."

The experiment, conducted on the campus of a large eastern university, was carried out to give a picture of the special problems created by shelter living. Ingenuity and determination were among the most valuable things the Powners took with them into the shelter.

The 8 by 9 ft. room was equipped with bunks and mattresses, shelves for food, two disposal cans, a folding card table and chairs, a chemical toilet, 38 gal. water, flashlight, and candles. A more-than-sufficient food supply was included.

Heat generated by the candles burning and the body temperatures of five persons in close quarters became a real problem, with the temperature sometimes reaching 80°F. Boredom plagued them after the first three days, and new pastimes were developed to combat it. The family took calisthenics together, marched to the cadence of their own "rhythm band," and assumed Indian indentities as a means of relieving tension and boredom.

Selecting the food for each meal became a family project. Aluminum foil dividers in a cooking utensil allowed several items to be heated at one time over a candle flame. Mrs. Powner found that canned heat was not satisfactory for preparing food in so small a space. She also warned not to use strong-smelling detergents or cleaners.

Losing track of the passage of time was depressing for the adults. Mr. Powner especially experienced a need for privacy and quiet. Both parents attempted to "spell" each other to give brief periods of release from tension.

The Powners found the experiment very enlightening. They appreciated the opportunity to devote time and attention to their children. All three youngsters adapted readily to shelter living and tended to be more independent of their parents when the experiment was over.

II. Frequency of Serving and Preferences as to Fresh and Processed Products

Fruits and Vegetables— How Do Meal Planners Feel about and Use Them?[1]

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TWO OF THE four nutrients most often below the recommended amounts, according to a recent study of nutritional status of persons in this country (1), are vitamin A and ascorbic acid. Fruits and vegetables supply an estimated three-fifths of the vitamin A value and nine-tenths of the ascorbic acid in the American diet (2). Since the per capita consumption of these foods has decreased in the past fifteen years, it is not surprising to find that the dietary level of these vitamins has also decreased. To raise the level of intake of these nutrients, the main recommendation of nutritionists is that the consumption of fruits and vegetables, particularly fresh fruits and vegetables, be increased.

Information obtained from numerous dietary surveys in colleges, agricultural experiment stations, and independent organizations has also indicated the need for including more fruits and vegetables in the normal diet (3). Consequently, when making the household survey in Butte County, California, two of the main purposes of the study were to determine: (a) meal planners' practices with respect to the frequency of serving fruits and vegetables to their families at breakfast, lunch, and dinner and (b) their preferences in the use of fresh, canned, frozen, and dried fruits and vegetables for specified purposes. This paper, the second in the series, presents this information.

Methodology

Interviews were obtained from a random sample of 680 households in Butte County in the summer of 1959. A closed-end questionnaire containing 182 questions was used by trained interviewers to obtain information from eligible meal planners. Detailed information with respect to sampling procedures and eligibility requirements of households was presented in the first paper of this series (4).

Frequency of Serving

Household food buyers were asked the number of times a week fruits and vegetables *usually* were served at breakfast, lunch, and dinner (Table 1), and also the number of vegetables usually served at dinner. Those who did not use fruits or vegetables at least once a week at a particular meal were grouped in a "not served" category. Dinner was defined as the heavier or main meal of the day, irrespective of the hour it was eaten. If snacks were usually eaten between meals, as was the case with a large number of old persons, they were included as part of the preceding meal; thus, if fruit was usually eaten before bedtime, it was included with the other foods eaten at the evening meal.

FRUITS AND VEGETABLES

Fruit was eaten by a majority of families only at breakfast, but even at this meal, it was completely omitted from the menu of about one-eighth of the families. More than half again as many families were served fruit daily at lunch than at dinner. On the other hand, families were served fruit more frequently from one to four times a week at dinner than at lunch. As a result the percentage who were not served fruit at the two meals a minimum of once a week was about the same.

As expected, practically all families served vegetables daily at dinner. About two-thirds also were served vegetables at lunch at least once a week, while over two-fifths received them daily. Although about the same percentage of families ate vegetables and fruit daily at lunch time, the per-

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TABLE 1 **Frequency of serving fruits and vegetables at various meals**

TIMES SERVED PER WEEK	PER CENT OF HOUSEHOLDS						
	Fruit			Vegetables except potatoes		Potatoes only	
	Breakfast	Lunch	Dinner	Lunch	Dinner	Lunch	Dinner
Once	4	4	7	2	*	8	6
Twice	9	12	15	10	1	7	13
3 times	9	7	18	5	1	3	14
4 times	5	7	11	3	1	1	14
5 times	3	5	4	3	*	1	8
6 times	1	1	*	1	*	*	3
7 times	57	45	28	42	97	5	36
Not served	12	19	17	34	*	75	6

*Less than half of 1%.

centage of families who did not eat vegetables at least once during the week was almost twice as great as the percentage not eating fruit.

It is interesting that, while three-fourths of the families did not eat potatoes during the week for lunch, only about one-twentieth did not eat them at least once a week for dinner. However, less than two-fifths of the families ate potatoes daily at dinner compared with about one-half who usually ate them from two to five times a week. Over nine-tenths of the families usually were served two or three vegetables including potatoes at dinner, three being indicated by 51 per cent and two by over 42 per cent of the food buyers.

Frequency of Serving by Six Classifications

Significant differences existed for the number of times fruits and vegetables were served at each meal and for the number of vegetables served at dinner when the findings were analyzed on the basis of six classifications; wife's age, family size, wife's employment status, family income, wife's education, and place of residence (Table 2).

Chi-square values were determined in the usual manner (5) for the respective groups in the six classifications. The frequency with which families in each group served fruits and vegetables daily, less than seven days a week, and not at all during the week was compared with the frequency to be expected on the basis of probability. Such an analysis provided additional insights concerning the relative importance given to fruits and vegetables by the different groups in each classification.

FRUIT AT BREAKFAST

For breakfast, significant differences existed in the number of times fruit was served when the data were analyzed on the basis of wife's age, family size, and wife's employment status (Table 2).

For the classification wife's age, results for three age groups were obtained: over fifty years, thirty to fifty years, and under thirty years. When the frequency with which families in each group served fruit was compared with that to be expected on the basis of probability, it appeared that the relatively older group, as a whole, placed greatest importance on serving fruit with breakfast. The median age group appeared to place the next most importance on including fruit and the relatively younger group the least importance.

Data were analyzed by five family-size groups ranging from two-person families to those having six or more members. For this classification, the tendency was for the two-person families to place much greater importance on the consumption of fruit at breakfast than the larger families.

In terms of the wife's employment status, data were analyzed for three groups: full-time and part-time employment and those not employed. It appeared likely that the consumption of fruit at breakfast was emphasized most by the group not employed, the part-time employed group was next, and the full-time employed last. It should be noted that in more than three-fourths of the two-person families, the wife was in the over-fifty group and that in about two-fifths of the families whose wives were not employed, the wife was also older.

It will be recalled that the relationship between

TABLE 2 **Significance of the frequency of serving fruits and vegetables at various meals, according to six classifications**

CLASSIFICATION	FRUIT			VEGETABLES EXCEPT POTATOES		POTATOES	
	Breakfast	Lunch	Dinner	Lunch	Dinner	Lunch	Dinner
Wife's age	1%		.1%	5%	5%		1%
Family size	5%		5%				.1%
Wife's employment status	5%	1%		5%			
Family income			5%			1%	
Wife's education			5%		5%	5%	.1%

wife's age and each of the other two classifications was significant at the 0.1 per cent level, while the relationship between family size and wife's employment status was not significant (4). Therefore, serving fruit for breakfast is related to each of the three independent classifications and appears to be most closely related to wife's age.

FRUIT AT LUNCH AND/OR DINNER

When the practice of serving fruit at lunch was analyzed on the basis of wife's employment, significant differences were revealed at the 1 per cent level. A comparison of the three employment groups indicated that the group not employed, on the whole, tended to place the greatest importance on the serving of fruit at lunch as it had done at breakfast. On the other hand, the group employed full-time was in the middle position, with the group employed part-time placing least importance on the serving of fruit for lunch.

An analysis of the data by the six classifications revealed that for dinner, significant differences existed for four classifications (Table 2): wife's age, family size, family income, and wife's education. The findings for the first two classifications were the same as for breakfast. By wife's age, the older group was highest, the median age group next, and the younger group lowest. By family size, the two-person families were highest.

For the classification family income, results were obtained for five income groups ranging from under $2,500 to $10,000 and over, with a $2,500 spread between each group. Families with an income of under $2,500 placed greater emphasis on the use of fruit than did those with higher incomes.

Data were analyzed according to three levels of education for the wife: one to eight years of elementary school, one to four years of high school, and one or more years of college. The importance given to the serving of fruit at dinner was: highest, elementary school; next highest, college; and lowest, high school.

These findings for dinner were consistent in terms of the relationships which existed between the four classifications. For example, in more than seven-tenths of the elementary school group and four-fifths of the under-$2,500-income group, the wife was over fifty years old and was living in a two-person family.

The relationships between the four classifications were significant at the 0.1 per cent level (4). Therefore, the practice of serving fruit at dinner was related to each of these independent classifications and, from the Chi-square values, appears to be most closely related to wife's age, next to family size and income, and last to wife's education.

VEGETABLES AT LUNCH AND/OR DINNER

Serving of vegetables for lunch was analyzed on the basis of wife's age and employment status. Significant differences were indicated at the 5 per cent level for both classifications. As with fruits served for breakfast and dinner, the findings by wife's age indicated that the older group gave greatest importance to including vegetables in lunches, with the medium and younger age groups following in that order.

The emphasis given to serving vegetables at lunch differed from that for fruits when the wife's employment status was the basis of classification; it was greater for those employed part-time than for either of the other two categories.

As pointed out earlier, the relationship between homemaker's age and employment status was significant at the 0.1 per cent level. Therefore, the practice of serving vegetables for lunch is related to each independent classification and from the magnitudes of the Chi-square values appears to be equally related to the two classifications.

For dinner, significant differences existed in the number of times vegetables were served when the data were analyzed on the basis of wife's age (Table 2) and education. A comparison of the three age groups indicated that the median age group, on the whole, tended to place the greatest importance, the younger group the next, and the older group the least on serving vegetables at dinner.

With respect to educational level of the meal planners, it was the college group that placed the most emphasis on consumption of vegetables at dinner, the high school group the next, and the elementary school group the least emphasis. The proportion of college-trained women in their respective age groups was: 31 per cent, median age; 24 per cent, younger; and 18 per cent, older.

Since the relationship between wife's age and education was significant at the 0.1 per cent level, the practice of serving vegetables for dinner is related to each of the independent classifications. Chi-square values indicate that it is more closely related to wife's education than to her age.

POTATOES AT LUNCH AND/OR DINNER

When the serving of potatoes for lunch was analyzed by wife's education and family income, significant differences were indicated at the 5 and 1 per cent levels, respectively. The elementary school group, as well as the under-$5,000-income group, placed a much higher value on eating potatoes at lunch than did the high school, college, and $5,000-and-over-income groups. The higher value indicated by the elementary school group was to be expected, since almost nine-tenths had incomes below $5,000.

Since the relationship between family income and wife's education was significant at the 0.1 per cent level, the practice of serving potatoes for lunch is, therefore, related to each independent classification and appears to be more closely related to the former.

Significant differences existed in the number of times families were served potatoes at dinner when the findings were analyzed by wife's education, family size, and wife's age (Table 2). An analysis of the data for these classifications indicated that it was primarily the younger, and, to a lesser extent, the median age groups, with an elementary or high school education, and living in families of five or more persons who considered serving potatoes for dinner most important.

The relationships between these three classifications were significant at the 0.1 per cent level (4). Therefore, serving potatoes at dinner is related to each of these independent classifications and from the magnitude of the Chi-square values appears to be most closely related to family size, next to wife's education, and lastly to wife's age.

NUMBER OF VEGETABLES AT DINNER

In terms of the number of vegetables including potatoes served at dinner, two or three were the customary numbers. Analysis revealed that for the number of vegetables served at dinner, significant differences existed for the four classifications of wife's education (0.1 per cent level), family's place of residence (0.1 per cent level), family size (5 per cent level), and wife's age (5 per cent level).

Three vegetables were served more frequently to families in which the food buyer was in the median age range, had a high school education, lived in either a rural non-farm or rural farm area, and had three or more persons in the family. Since families in the median age group, high school group, and five-or-more-person family groups served potatoes more frequently than would be expected on the basis of probability, it appears that these groups customarily tended to eat two vegetables other than potatoes for dinner, while those in rural non-farm and rural farm areas, as well as in three- and four-person families, tended to eat three vegetables other than potatoes.

Two vegetables were served more frequently when the food buyer was in the younger or older ranges, had an elementary or college education, lived in an urban area, and had two persons in the family. Since families in the younger and elementary school groups tended to serve potatoes more frequently than would be expected, it appears that these groups tended to include only one vegetable other than potatoes on their dinner menus, while those in the older, college, two-person family, and urban groups were likely to omit potatoes and eat two other vegetables.

The relationships between wife's education and the other three classifications were significant at the 0.1 per cent level, as was that between family size and wife's age. Differences between place of residence and either family size or wife's age were not significant. Therefore, the number of vegetables including potatoes served at dinner is related to each of these independent classifications and from the magnitudes of the Chi-square values appears to be most closely related to wife's education and family's place of residence, next to family size, and lastly to the homemaker's age.

Uses of Fresh and Processed Products

When both fresh and processed fruits and vegetables were available, household food buyers were asked which they *usually* used for various purposes (Table 3). Their replies ranged from one to a combination, consisting of fresh, canned, frozen, and dried. Those who did not use fruits and vegetables for a particular purpose were grouped in a "not used" category.

The relative importance of using fresh and processed fruits was obtained for the following purposes: breakfast, special-occasion meals, salads, and desserts. For all purposes except desserts, fresh fruits were used by a majority of the families. In addition, fresh fruits were used for breakfast by a larger proportion of families than for any other purpose. By comparison, canned fruits were used more frequently for salads and desserts than for breakfast or special-occasion meals. Only a small minority used frozen fruits for each purpose, while dried fruits were used for breakfast only and then by about 1 per cent of the families.

Of the combinations mentioned, the most frequently indicated for each purpose was fresh and canned. For breakfast, this combination was mentioned by 5 per cent of the families, for special-occasion meals by 11 per cent, for salads by 14 per cent, and for desserts by 16 per cent. Of those not using fruit for the various purposes, breakfast was mentioned by a much higher proportion of families than were the other purposes.

TABLE 3 Frequency of use of fresh and processed fruits and vegetables for specified purposes

USE	PER CENT OF HOUSEHOLDS					
	Fresh	Canned	Frozen	Dried	Combi-nations	Not used
Fruits						
Breakfast	64	13	4	1	6	12
Special-occasion meals	56	19	4	*	18	3
Salads	55	25	1	0	15	4
Desserts	45	25	1	*	24	5
Vegetables						
Soups	53	8	2	1	8	28
Salads	83	4	1	0	11	1
Casseroles	18	33	7	1	12	29
Separate dish—main meal	63	10	13	*	14	*
Separate dish—occasional meals	65	7	15	*	13	*

*Less than half of 1%.

The relative importance of using fresh and processed vegetables was obtained for the following purposes: soups, salads, casseroles, separate dish as part of the main meal, and separate dish as part of special-occasion meals. Fresh vegetables were used by a majority of families for all purposes except casseroles. A larger proportion of families used fresh vegetables in salads than for any other purpose.

On the other hand, canned vegetables were used most frequently for casseroles, while frozen vegetables were used most frequently as a separate dish with either main meals or special-occasion meals. The tendency was for a larger proportion of families to use canned fruits than canned vegetables for the different purposes, while the reverse relation applied to frozen fruits and vegetables.

The combination of vegetables mentioned most frequently was fresh and canned for soups (4 per cent), salads (10 per cent), casseroles (7 per cent), and fresh and frozen as a separate dish with either the main meal (7 per cent) or special-occasion meals (9 per cent). Over one-fourth of the food buyers did not make soups or casseroles often enough to reply.

Uses of Products by Six Classifications

When the data were analyzed on the basis of six classifications, significant differences existed in the frequency of use of fresh and processed fruits and vegetables for specified purposes (Table 4). For fruits, the differences were significant for the canned, frozen, and dried products when used for breakfast, salads, and special-occasion meals but not significant for desserts. By comparison, for vegetables significant differences were indicated for fresh, canned, and frozen vegetables used for each purpose. It appeared that many more significant differences existed for fresh and processed vegetables than for fruits.

For each purpose, Chi-square values were determined for the respective groups in each classification. The frequency with which families in each group served fresh, canned, frozen, and dried fruits and vegetables, served various combinations of the fresh and processed products, and did not use fruits or vegetables for a particular purpose was compared with the frequency to be expected on the basis of probability. Such an analysis provided additional insights concerning: (a) the relative importance given to the use of fresh and processed fruits and vegetables by the different groups in each classification; and (b) the preferences of families in the different groups for fresh, canned, frozen, and dried fruits and vegetables.

For both fruits and vegetables, an analysis of the data indicated that, irrespective of the purpose, different groups in a given classification tended to use the fresh or processed products to a greater or lesser extent than other groups. For example, if the elementary school group made greater use of canned fruits than the college group for breakfast, it also made greater use of canned fruits for special-occasion meals. For this reason, a summary of the findings for fruits and for vegetables will be presented on the basis of the fresh and processed products rather than on the basis of the purpose for which the products were used.

PREFERENCES FOR FRESH AND PROCESSED FRUITS

For *canned* fruits, meal planners in the relatively older age range with an elementary school education and living in urban areas placed greatest importance on the use of canned fruits; those in the

TABLE 4 Significance by six classifications of the frequency of use of fresh and processed fruits and vegetables for specified purposes

USE	CLASSIFICATION AND SIGNIFICANCE				
	Fresh	Canned	Frozen	Dried	Not used
Fruits					
Breakfast		education—1%	family size—1%	education—.1%	employment—1%
Special-occasion meals		age—.1%	age—5%		
		education—5%			
Salads		place of residence—5%			
Vegetables					
Soups		place of residence—5%	income—5%		family size—5%
Salads		age—5%			
Casseroles	age—1%	age—1%	education—5%		family size—5%
	income—1%	place of residence—5%	age—5%		age—5%
			family size—5%		education—1%
					place of residence—1%
Separate dish — main meal	age—5%	age—1%	education—5%		
		family size—5%	income—1%		
Separate dish — special-occasion meals			education—5%		
			income—1%		

median age range with a high school education and living in rural farm areas were next, and those in the younger age range with a college education and living in rural non-farm areas were last.

When evaluating *frozen* fruits, meal planners in the younger range and in families of five or more persons placed greatest emphasis, those in the median age range and in three- or four-person families the next and those in the older range and in two-person families the least emphasis on frozen fruits. It thus appeared that the older group's preferences were greatest for canned fruits, whereas the younger homemakers preferred frozen fruits.

For *dried* fruits, the findings indicated that much more importance was placed on their use by the elementary school than by the high school or college groups.

PREFERENCES FOR FRESH AND PROCESSED VEGETABLES

Analysis of the data indicated that the older group and the under-$2,500-income group placed the most emphasis on *fresh* vegetables, the median age group and the $2,500-to-$7,500-income groups the next, and the younger group and the $7,500-and-over-income groups the least emphasis.

A pronounced tendency existed for increasing importance to be placed on the use of *canned* vegetables as family size increased. For wife's age, the relative importance indicated by the three age groups was just the reverse of that for canned fruits, namely, highest for the younger group, next for the median age group, and lowest for the older group. On the other hand, the relative importance indicated by the three residence groups for canned vegetables was the same as that for canned fruits, namely, highest for the urban group, next highest for the rural farm group, and lowest for the rural non-farm group.

For *frozen* vegetables, as for frozen fruits, greatest emphasis was indicated by the younger group and the five-or-more-person families, the next by the median age group and three- and four-person family groups, and the least by the older group and the two-person family group. In addition, the college and the $10,000-and-over income groups also placed the most importance on the use of frozen vegetables, with the high school and $5,000-to-$10,000-income groups next, and the elementary school and under-$5,000-income groups last.

For the *not used* category, two- and three-person families tended to put less emphasis on the making of soups than did four-or-more-person families, but only two-person families tended to put much less emphasis on the making of casseroles than did larger families. In addition, the importance given to casseroles was least for meal planners in the older age range having elementary school training and living in rural non-farm areas; the middle group was that of the younger homemakers having high school training and living in rural farm areas, while the top category was that of the median age group having college training and living in urban areas.

Summary

Meal planners served fruits and vegetables (except potatoes) at all meals most frequently seven days a week than either fewer than seven days or not at all. While potatoes also were served at dinner most frequently on a daily basis, they were not served at lunch even once a week by the majority of meal planners. Either two or three vegetables were customarily served at dinner.

Significant differences in the number of times a week fruits, vegetables, and potatoes were served were most numerous when the data were analyzed by wife's age than by any other classification. Differences were next most numerous when the data were analyzed according to wife's education, employment status, and family size; they were least numerous when analyzed by family income. Differences were not significant with relation to the family's place of residence. Significant differences in the number of vegetables served at dinner existed for all classifications except wife's employment status and family income.

Fresh fruits and vegetables were used by more homemakers than were canned, frozen, and dried for all but one specified purpose. For fruits, more significant differences existed in the use of the canned than of the frozen and dried products; there were no significant differences in the use of fresh fruits. For vegetables, significant differences were most numerous for frozen, next for canned, and least for fresh; no significant differences existed in the use of the dried product.

Differences in the use of processed fruits were greatest when the data were analyzed by wife's age and education. On the other hand, differences for fresh and processed vegetables were greatest when the data were analyzed not only by wife's age and education but also by family income.

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I. In the Bain Marie

Time-Temperature Relationships of Custards Made with Whole Egg Solids[1]

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USE OF whole egg solids in food production has been limited by recommendation of federal agencies (1, 2), on the basis of the thoroughness of cooking. It is felt that if the product were not "thoroughly cooked," Salmonella organisms that might be present would not be destroyed. Soft, or stirred custard is one item invariably included on the lists entitled "do not prepare with whole egg solids." If it could be shown that stirred custards of high culinary quality are heated in quantity preparation to such a degree that any Salmonella present would be destroyed, the use of whole egg solids in institutions could be extended. The most frequent use of stirred custards in quantity food preparation is for custard sauce; therefore, custard sauces made with a cornstarch base were chosen for study.

This study was conducted to determine the effect of varying selected factors on the time-temperature relationships in custard sauces when cooked to three end-points in a bain marie: the disappearance of the raw starch taste, the first substantial thickening, and a definite consistency as determined by a line-spread value. Each of these end-points is mentioned as a criterion for "doneness" for egg-starch mixtures in quantity recipes. Therefore, it can be presumed that a custard sauce might be considered "done" at any of these end-points. The time-temperature relationships terminated by the three end-points of cooking were evaluated in terms of the possible bacteriologic quality of the custards.

[1]Reported from the unpublished master's thesis of Cathrine Miller. This is a part of a larger project, "Quality of Selected Menu Items, Prepared in Quantity, with Whole Egg Solids." Received for publication June 13, 1960.

Solowey *et al.* (3), in a survey of 5198 samples of high-moisture (4 to 6 per cent) egg solids produced in the United States, found 35 per cent of the samples to be positive for Salmonella. Only one report (4) of Salmonella-caused food poisoning that was attributed to whole egg solids in the United States could be found in the literature between 1943 and 1959.

Various studies (5-9) have been conducted to determine the thermal death times of Salmonella in liquid whole egg at varying *p*H values. These studies have been extensively reviewed by Miller (10).

It has been recommended (2,5) that only the amount of solids to be used immediately should be reconstituted. Once reconstituted, whole egg solids are equivalent to, and should be handled as fresh whole eggs. Any bacteria able to grow in fresh whole eggs should grow equally well in reconstituted whole egg solids.

Cathcart *et al.* showed (11) that bakery custards inoculated with *S. enteritidis* and cooked by various methods were completely sterile.

Kintner and Mangel (12) inoculated a custard-type pudding with seven strains of Salmonella. The contaminated egg mixture was added to the thickened starch mixture at 198° to 208°F. (92° to 98° C.), the mass was reheated to 172° to 187° F. (78° to 86° C.) and held there ½ min. After 24-hr. storage at room temperature, they found *S. pullorum* No. 19 and *S. oranienburg* to be viable.

Angelotti *et al.* (13) conducted thermal-death-time studies using *S. senftenberg* 775W and various Staphylococcus strains in custard. They concluded that heating these perishable foods and holding

every particle of food at a temperature of 150°F. (66°C.) for at least 12 min. reduced 10 million or fewer Salmonellae or Staphylococci per gram to levels which were not detectable.

Experimental Procedure

FORMULAS AND METHODS

All ingredients were ordered in sufficient quantity for the entire study. The whole egg solids[2] had been processed as follows: the glucose was removed by the enzyme method; the product was pasteurized at 142°F. (61°C.) for 3½ min. and spray-dried to a moisture content of just under 5 per cent (14).

On the recommendation of the manufacturer (14), the whole egg solids were reconstituted in the proportion of one part solids to three parts water by weight. Water temperature was 100°F. (38°C.). The formulas are presented in Table 1.

Two procedures for combining ingredients were used. The two-step method consisted of combining three-fourths of the milk and half of the sugar and heating this mixture to a desired temperature. The cornstarch and remaining half of the sugar were sifted together twice and combined with the reconstituted whole egg solids. The remaining one-fourth of the milk was then combined with the egg mixture. The temperature was adjusted to 59°F. (15°C.) and the egg mixture then stirred into the heated milk by a motion that was up-and-down, as well as around.

The three-step method consisted of heating all of the milk to the desired initial temperature. The corn tarch and half of the sugar were sifted together twice, and a small portion of the heated milk was added to the cornstarch mixture under stirring. This mixture was then combined with the heated milk. A preliminary study had shown that the amount of milk heated initially had little effect on the temperatures attained near the surface of the sauce during the major part of the cooking period. The starch-milk mixture was cooked until the raw starch taste disappeared and was agitated at 5-min. intervals. The reconstituted egg and remaining half of the sugar were beaten together and the temperature adjusted to 86°F. (30°C.) The egg mixture was then combined with the cooked-starch suspension.

A 14-in. wire whip was used in agitating the custard sauces. A ten-stroke technique, consisting of five circular up-and-down strokes on each side of the cooking vessel was employed.

Five- and 15-min. intervals between agitation periods were used. A preliminary study had shown that more frequent or continuous agitation resulted in higher temperatures near the surface of the sauces. Longer intervals between agitation were desirable from the viewpoint of practical application of these results, since continuous, or very frequent, agitation would probably not be used in the quantity preparation of custards.

Because a "skin" tended to form over the surface of the custards, the experimental batches were cooked in a covered vessel, although a preliminary study had shown that the temperatures attained near the surface of the sauces were higher when these were cooked in a covered vessel than when they were cooked in an uncovered vessel.

An institution-sized bain marie, 24 by 48 by 10 in., was the source of heat. The depth of water surrounding the pots was 4 in. The temperature of the water bath ranged from 197° to 206°F. (92° to 97°C.). The 4-qt. batches of sauce were cooked in a 6½-qt., semi-heavy aluminum insert[3]. The sauces had a depth of 5¾ in. and therefore, extended 1¾ in. above the level of the water. The 8-qt. batches were cooked in a 12-qt., semi-heavy aluminum stockpot[4]. The sauces had a depth of 7 in., thus extending 3 in. above the water level.

OBSERVATIONS AND TESTS

The times at which the above-mentioned phenomena associated with the three end-points of cooking occurred, were noted. The occurrence of the first phenomenon, i.e., disappearance of the raw starch taste, was determined by tasting. The occurrence of the second end-point (first substantial thickening) was based on the "feel," or consistency, of the custard sauces as judged by the principal author who had developed skill in detecting consistency changes in custards. Final doneness was ascertained by linespread determinations.

Temperatures were automatically recorded every 17 seconds by an electronic potentiometer[5]. One thermocouple was placed in the water bath. Another was placed in the air, because, depending on batch size, a more or less large portion of the custard was accessible to the cooling effect of the air. The thermocouple was placed 3½ ft. above the custard

[2]Henningsen, Inc.

TABLE 1 Formulas used in the preparation of custard sauces

BATCH SIZE	AMOUNT OF EGG*	RECONSTITUTED EGG	CORNSTARCH	RECONSTITUTED MILK†	SUGAR
qt.	*%*	*gm.*	*gm.*	*gm.*	*gm.*
4	12.5	487.5	78	3900	453.6
4	9.5	372	78	3900	453.6
8	12.5	975	156	7800	907.2
8	9.5	744	156	7800	907.2

*Based on the weight of the milk.
†Spray-dried, nonfat milk solids, reconstituted in the proportion of 1 lb. solids to 1 gal. water.

[3]Wearever, Model 4376½
[4]Wearever, Model 4360
[5]Minneapolis-Honeywell, Model 143 × 64P12- × -41

and 3½ ft. to the side. Two thermocouples were located in the center of the sauce, midway between the bottom of the pot and the surface, and two were located in the center, ½ in. from the surface. An extensive preliminary study had shown that the center of the sauce, ½ in. to ¼ in. from the surface, was the coolest area, and that the center of the sauce, midway between the bottom of the pot and the surface, was approximately the average of the temperatures at the bottom and at the surface.

The *p*H values of the reconstituted whole egg solids and of the custard mixtures immediately after the egg was added to the heated milk were determined using a *p*H meter[6].

The relative viscosity of the sauces was determined by the Grawemeyer and Pfund linespread device as modified by Billings (15). A heated metal[7] disk having the same volume as the sample was slipped into the custard when a sample was removed. Because the disks interfered with stirring to some extent, no more than three disks were ever added and no more than three linespread determinations were made on any batch. The first linespread determination was made within 1 min. of the time the raw starch taste disappeared; the second and third tests were made at the times custard reached the desired final consistencies. A desirable final consistency was determined by ten judges to be related to a linespread between 30 and 35 mm., and for this study was set at 33 mm. or slightly less.

Two replicates of a completely random factorial experiment were carried out. The variables were: the batch size (4-qt. and 8-qt.); the amount of egg in the formula (9.5 and 12.5 per cent, based on the weight of the milk); the initial temperature of the milk before the egg mixture was added (149° F. [65° C.] and 194° F. [90° C.]); the method of combining ingredients (two- and three-step); and the interval between agitation (5 and 15 min.).

Results

For the reconstituted solids, the *p*H ranged from 6.8 to 7.1, and for the custards, from 6.1 to 6.5.

The time during which the center of the custard sauces, ½ in. from the surface, remained within certain temperature ranges are presented in Tables 2 and 3. The factors that affected the time during which the custard sauces remained at and above 141°F. (61°C.), as determined in the center of the sauce ½ in. from the surface, were compared in statistical analyses of a factorial design. The times required to reach each end-point of cooking

[6]Beckman, Model G.
[7]Kwik-Metal.

TABLE 2 Time* during which 4- and 8-qt. batches of custard sauce made by the two-step method of combining ingredients remained within certain temperature ranges at a location ½ in. from the surface while being cooked to three end-points

AMOUNT OF EGG†	INITIAL TEMPERATURE OF MILK	INTERVAL BETWEEN AGITATION	COOKING TIME							
			End-point 1 ‡				End-point 2 # ¶		End-point 3 ‖ ¶	
			At or below 140°F.	141°-150°F.	151°-160°F.	Above 160°F.	151°-160°F.	Above 160°F.	151°-160°F.	Above 160°F.
			4-Qt. Batches							
%	°F.	min.	min.	min.	min.	min.	min.	min.	min.	min.
9.5	149	5	0.6	2.6	4.0	8.2	4.0	26.5	8.8	39.6
9.5	149	15	0.8	3.0	13.6	2.1	16.6	8.1	34.3	20.4
9.5	194	5	—	1.7	5.4	1.6	5.4	1.9	21.3	11.2
9.5	194	15	—	2.9	8.7	—	10.9	—	36.6	0.6
12.5	149	5	1.2	2.9	6.9	17.1	6.9	18.0	8.5	26.4
12.5	149	15	2.9	9.1	5.4	1.4	14.7	1.6	24.9	6.7
12.5	194	5	—	—	3.6	1.8	3.6	10.0	6.1	17.7
12.5	194	15	—	0.2	8.8	—	13.6	—	23.4	4.9
			8-Qt. Batches							
9.5	149	5	1.4	2.6	5.8	3.8	7.3	22.6	17.4	49.8
9.5	149	15	2.9	10.7	1.5	4.1	16.2	14.1	33.6	32.7
9.5	194	5	—	0.2	4.5	4.4	4.5	9.3	6.1	38.6
9.5	194	15	—	0.2	9.7	—	13.3	—	45.4	8.2
12.5	149	5	2.6	3.9	5.3	13.9	5.4	21.4	5.7	41.5
12.5	149	15	4.9	8.4	3.6	9.9	3.6	11.7	19.8	40.3
12.5	194	5	—	0.2	7.2	9.1	10.2	13.2	17.4	25.6
12.5	194	15	—	0.6	13.0	0.6	21.3	5.4	40.8	16.3

*Timing began 1 min. after egg was added to heated milk mixture. Values represent means of two replications.
†Based on the weight of the milk.
‡Disappearance of raw starch taste.
#First substantial thickening.
¶The minutes at or below 140°F. and the minutes at 141° to 150°F. were the same as for end-point 1.
‖Definite linespread value.

were analyzed separately. The three-step method of combining ingredients was not included in the analyses of the time needed for the disappearance of the raw starch taste because the starch had thickened and the raw starch taste had disappeared before the egg was added.

When the raw starch taste disappeared (end-point 1), the amount of egg in the formula and the initial temperature of the milk were the only highly significant sources of variance. At the time of the first substantial thickening (end-point 2), all sources of variance except the amount of egg were highly significant. When the custards were cooked to a consistency as characterized by a fixed linespread value (end-point 3), all sources of variance were highly significant. The method of combining ingredients was the most significant factor affecting cooking time. Figure 1 illustrates a typical difference in the heating curves of custards made by the two- and three-step methods.

At end-point 1, temperatures ½ in. from the surface tended to be similar in all batches made by the two-step method. At end-point 2, the lower initial temperature of the milk, 149°F. (65°C.), and the 5-min. interval between agitation periods were the only variables which tended to produce relatively high temperatures. When the custards were cooked to end-point 3, the only variable tending to produce relatively high temperatures was a 5-min. interval between agitation periods.

Discussion and Conclusions

Since the temperatures within a custard sauce are affected by the temperature and height of the heating water, as well as the agitation of the custard, the data collected would apply only when heating conditions resemble those used in this study.

The statistical analysis[8] is based on the periods during which temperatures ½ in. from the surface of the sauces were maintained at and above 141°F. (61°C.) during cooking. Since the thermal death times for various Salmonellae in a liquid egg substrate at temperatures near 140°F. (60°C.) are available, 141°F. (61°C.) was chosen as the minimum temperature used in the statistical analysis[9]. Actually, the custards were below this temperature for short periods at the beginning of cooking.

These data include only the temperatures ½ in. from the surface of the sauces. The temperatures in the middle and lower areas of the custards were

[8]The authors wish to express their appreciation to Glenn F. Atkinson and Wallace R. Blischke, Graduate Assistants in the Department of Plant Breeding, Biometrics Unit, for their assistance in the statistical analysis of these results.

[9]The data by Angelotti *et al.* (13) had not been published at the time of this study.

TABLE 3 Time* during which 4- and 8-qt. batches of custard sauce made by the three-step method of combining ingredients remained within certain temperature ranges at a location ½ in. from the surface while being cooked to two end-points

AMOUNT OF EGG†	INITIAL TEMPERATURE OF MILK	INTERVAL BETWEEN AGITATION	COOKING TIME					
			End-point 2‡ #			End-point 3¶ #		
			141°-150°F.	151°-160°F.	Above 160°F.	141°-150°F.	151°-160°F.	Above 160°F.
4-Qt. Batches								
%	°F.	min.	min.	min.	min.	min.	min.	min.
9.5	149	5	0.3	3.9	4.3	1.7	16.9	7.4
9.5	149	15	—	4.9	8.5	—	14.7	13.9
9.5	194	5	—	—	—	0.6	3.3	7.5
9.5	194	15	—	—	—	2.7	10.9	—
12.5	149	5	—	0.3	3.4	—	0.3	10.9
12.5	149	15	—	10.0	3.6	—	13.9	7.5
12.5	194	5	—	—	—	—	3.1	6.0
12.5	194	15	—	—	—	—	14.1	—
8-Qt. Batches								
9.5	149	5	—	0.6	8.4	—	2.7	32.2
9.5	149	15	0.2	7.8	6.1	0.2	25.0	33.7
9.5	194	5	—	—	—	—	4.0	7.0
9.5	194	15	—	—	—	0.2	13.3	—
12.5	149	5	—	3.4	10.5	—	3.4	35.7
12.5	149	15	—	10.9	3.0	—	30.6	13.0
11.5	194	5	—	—	—	—	3.4	0.2
12.5	194	15	—	—	—	—	8.5	4.9

*Timing began 1 min. after egg was added to the cooked starch mixture. Values represent the means of two replications.
†Based on the weight of the milk.
‡First substantial thickening.
#The columns "minutes at or below 140°F." are omitted; with the three-step method, none of the temperatures recorded fell in this category.
¶Definite linespread value.

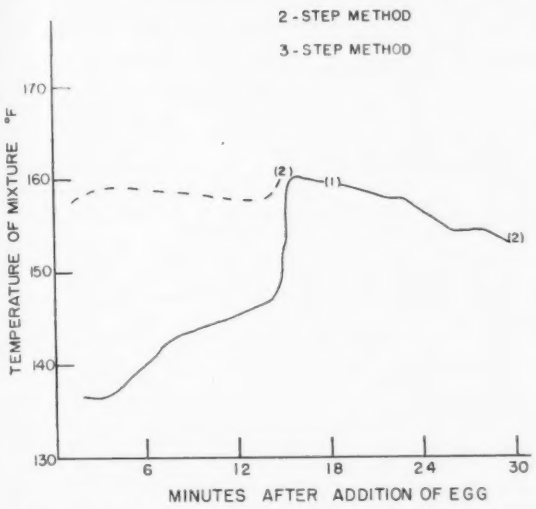

FIG. 1. *Temperature curves of comparable batches of custard sauce prepared by the two- and three-step methods of combining ingredients. Temperatures were recorded ½ in. from the surface. Custards were cooked to two end-points: the disappearance of the raw starch taste (1) and the first substantial thickening (2).*

much higher (Fig. 2), and the temperatures in the area less than ½ in. from the surface of the sauce would be lower than those presented in the tables and considered in the statistical analyses.

BACTERIOLOGICAL CONSIDERATIONS

The evaluation of the data collected in this study is concerned with two aspects: the length of the heating times at and above 141°F. (61°C.) and the temperatures attained during cooking.

Custards Cooked to End-Point 1. The only batches of custard sauce made by the two-step method of combining ingredients that were considered servable at the time the raw starch taste disappeared were the 4-qt. batches made from a formula which contained a high amount of egg with milk at an initial temperature of 149°F. (65°C.). A study of the raw time-temperature data reveals temperatures above 150°F. (66°C.) for 3.9 to 24.3 min. The cumulative heating time above 150°F. was often less than 12 min. In light of the work of Angelotti *et al.* (13), these custards cannot be considered safe.

In the three-step method, because the egg was not added to the starch mixture until the raw starch taste had disappeared, it is impossible to evaluate the bacteriologic quality of these custards at end-point 1.

Custards Cooked to End-Point 2. This end-point of cooking is the stage most frequently referred to as "doneness" in the directions for preparing stirred custards. In batches made by the three-step method, with the milk heated to an initial temperature

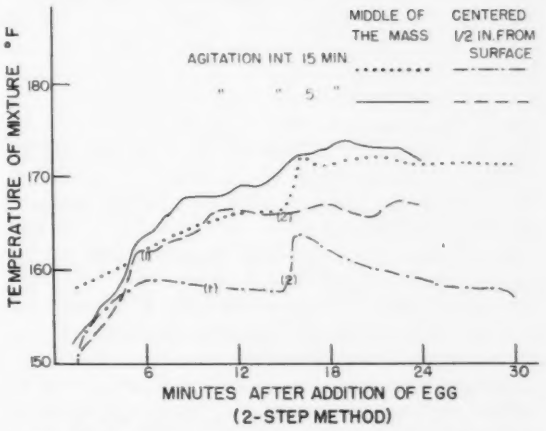

FIG. 2. *Temperatures of custard sauces determined in the middle of the batch and ½ in. from the surface. Custards were cooked to three end-points: the disappearance of the raw starch taste (1), the first substantial thickening (2), and a definite consistency.*

of 194°F. (90°C.), the first substantial thickening occurred so quickly that no temperature readings could be obtained within the custard, and it is thus impossible to discuss their bacteriologic quality. In the remaining custards made by the three-step method, and in all of the custards made by the two-step method, temperatures remained at and above 150°F. (66°C.) for 3.3 to 30.9 min. (raw data). Again, it is not certain that this treatment would be sufficient to kill the heat resistant Salmonellae.

Custards Cooked End-Point 3. When cooked to a consistency that was most preferred by the judges, all of the sauces maintained temperatures well above 150°F. (66°C.) for periods of 3.6 to 74.4 min. However, some of the shorter heat treatments might not be sufficient to destroy the more heat-resistant strains of Salmonellae. At present, results of thermal death time-temperature studies involving Salmonellae in custards are not available for some of the temperatures encountered in this study. Many of the batches reached temperatures considerably higher than those used by Angelotti *et al.* (13). It may be expected that shorter killing times may result from exposure to these higher temperatures. Only when these data involving higher temperatures are available will it be possible to predict more accurately the safety of custard sauces made with whole egg solids.

Summary

This study was conducted to investigate the effect of varying selected factors on the time-temperature relationships in custard sauces cooked to three end-points: the disappearance of the raw starch taste, the first substantial thickening, and a definite consistency as determined by linespread. A bain marie water bath maintained at a temperature range of

196° to 206°F. (91° to 96°C.) was the source of heat. The variables were: the batch size (4-qt. and 8-qt.); the amount of egg in the formula (9.5 and 12.5 per cent, based on the weight of the milk); the initial temperature of the milk before the egg mixture was added to it (149°F. [65°C.] and 194°F. [90°C.]); the method of combining ingredients (two and three steps); and the interval between agitations (5 and 15 min.).

In general, the conditions leading to prolonged cooking times at and above 141°F. (61°C.) were: large batch size, milk of a low initial temperature, the two-step method of combining ingredients, and a long interval between agitations. The factor effective in producing relatively high temperatures within the sauces was a short interval between agitation periods.

In evaluating the possible bacteriologic quality of these custards, no definite conclusions could be drawn from the time-temperature data gained. Thermal death time-temperature studies should follow, involving the application of temperatures higher than those used by Angelotti *et al.* (14) and the use of the more heat-resistant strains of food poisoning bacteria in a custard subtrate.

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Narcotic-Like Effect of Nutmeg

Reports from correctional institutions that powdered nutmeg ranks among substances commonly used by prisoners to attain euphoria prompted a pilot study at the New Jersey State Prison in which ten male inmates, twenty-three to forty-two years of age, were studied for three years by means of observation and introspective reports. When eight to twelve drachms of nutmeg were taken orally, narcotic effects of hallucinogenic loftiness often accompanied by drowsiness or excitement ensued within 10 min. to 4 hr. and lasted from 4 to 24 hr. Resulting moods were not consistent, but increased alertness usually occurred. There was no differentiation between verbal explanation of effects of marijuana, heroin, alcohol, and nutmeg. Side effects of nutmeg ingestion were thirst, insomnia, nausea, tachycardia, abdominal spasm, and constipation. During the study, two of the subjects became psychotic for a period of six months due to chronic nutmeg intoxication.

Although nutmeg is carefully guarded in prisons because of the high premium placed on its possession, it is accessible in households as a spice derived from drying and grinding the aromatic, pungent, nut-like seed. Myristicene, a poison in the aromatic oil, is believed to be the source of nutmeg's narcotic power. Further research under controlled conditions is indicated to confirm observations and to investigate eugenol present in nutmeg as a possible euphoria-inducing factors.—*Abstracted from "Hallucinogenic and Narcotic-Like Effects of Powdered Myristica (Nutmeg)" by G. Weiss. Psychiatric Quart. 34: 346, 1960. Contributed by Ellen M. Welz, Dietetic Intern, Veterans Administration Center, Los Angeles.*

II. In the Steam-Jacketed Kettle

Time-Temperature Relationships of Custards Made with Whole Egg Solids[1]

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TIME-TEMPERATURE relationships for custard sauces cooked in the bain marie have been reported (1). Because not all institutions have a bain marie available or do not choose to use one in preparing custards, these are frequently prepared in the steam-jacketed kettle. This study was conducted, therefore, to determine the effect of varying selected factors on the time-temperature relationships in custard sauces cooked in a steam-jacketed kettle to three end-points. The end-points were: the disappearance of the raw starch taste, the first substantial thickening, and a definite consistency as determined by a linespread value (1).

Experimental Procedure

FORMULAS AND METHODS

The ingredients and formulas were the same as those reported previously (1).

The two procedures for combining ingredients were: a two-step method and a three-step method. Preliminary studies showed that the milk tended to scorch during the initial heating. Therefore, the methods used in preparing custards in a bain marie (1) were altered to make use of Billings' observation (2) that cream pie fillings scorched less readily when all of the sugar was added to the milk during the initial heating period.

The two-step method was as follows: All of the sugar and three-fourths of the milk were heated to 194°F. (90°C.). The egg and the remaining one-fourth of the milk were beaten 120 strokes by hand and the temperature of the mixture adjusted to 59°F. (15°C.). The egg mixture was added to the heated milk mixture and agitation begun.

The three-step method was: All of the sugar and part of the milk were heated to 194°F. (90°C.). The starch and 2 c. cold milk (4-qt. batch) or 4 c. cold milk (8-qt. batch) were mixed 150 strokes by hand. The starch mixture was added to the heated milk mixture and cooked under stirring until the raw starch taste disappeared. One c. (4-qt. batch) or 2 c. (8-qt. batch) of the cooked starch mixture were added to the egg and this mixture combined with the cooked starch mixture in the steam-jacketed kettle. Agitation was then resumed.

The wire whip previously described (1) was used. An up-and-down circular stroke from the center of the kettle to the side was employed. Twelve such strokes were made around the kettle over a 15-second period. After each agitation, stirring was suspended for 2 seconds so that temperatures could be recorded.

Interval between agitations could not be employed as a variable in this study, because a preliminary study had shown that long intervals between agitation periods invariably resulted in a curdled custard.

A 12-qt. aluminum steam-jacketed kettle, two-thirds jacketed, was the source of heat. The steam input was constantly adjusted to the desired pressure. The maximum steam pressure was 15 lb. The level of both batch sizes of custard were within the area of the steam jacket.

OBSERVATIONS AND TESTS

The custards were tested to determine the disappearance of the raw starch taste, and changes in

[1]This is part of a larger project, "Quality of Selected Menu Items, Prepared in Quantity, with Whole Egg Solids. Received for publication June 13, 1960.

consistency were determined by the "feel" of the sauces. These observations and tests have been fully described (1).

Temperature determinations were made by means of thermocouples attached to the wire whip used for agitating the sauces. Temperatures were automatically recorded every 17 seconds by an electronic potentiometer[2]. Five thermocouples were placed around the spokes of the wire whip. One was placed in the air at 3½ ft. above and 3½ ft. to the side of the kettle. During the 2 seconds in which agitation was suspended, the wire whip was held upright through the center of the sauce, so that the level of the thermocouples was ½ in. below that of the custard.

The relative viscosity of the sauces was determined by means of the Grawemeyer and Pfund linespread device as modified by Billings (2). Samples for linespread determinations were removed from the custard within 30 seconds of the time the raw starch taste disappeared, since this was the first phenomenon to occur; and again, when the custard appeared to have reached the desired final consistency which was characterized by a linespread value of 35 mm. or slightly less. Each sample was immediately covered with waxed paper and allowed to stand at room temperature for not more than 15 min., when the linespread was determined.

Two replicates of a completely random, incomplete block design experiment were carried out. The variables were: the batch size (4 and 8 qt.); the amount of egg in the formula (9.5 and 12.5 per cent, based on the weight of the milk); the method of combining ingredients (two and three steps); and the pressure of the steam entering the steam-jacketed kettle (5 and 10 lb. for the two-step method, and 5, 10, and 15 lb. for the three-step method). A preliminary study had shown that when 15 lb. steam pressure were used in cooking the custard sauces made by the two-step method, the sauces were badly scorched.

[2]Minneapolis-Honeywell, Model 153 × 64 P12-×-41.

Results

The time during which the center of the custard sauces, ½ in. from the surface, remained at certain temperature ranges are presented in Tables 1 and 2. Some typical differences in the lengths of cooking time attributable to batch size, method of combining ingredients, and steam pressure employed, are given in Figures 1 to 3.

The temperatures attained during the cooking of the custards were plotted on graphs and comparable batches were compared. No differences attributable to the variables employed were found; therefore, these graphs are not presented.

The factors that affected the length of time during which the custard sauces remained at and above 151°F. (66°C.) were compared in statistical analyses done for each end-point of cooking.

At the time the raw starch taste disappeared (end-point 1), the batch size and the steam pressure

TABLE 1 Time* during which batches of custard sauce made by the two-step method of combining ingredients remained within certain temperature ranges at a location ½ in. from the surface while being cooked to three end-points

AMOUNT OF EGG†	STEAM PRESSURE	COOKING TIME								
		End point 1 ‡				End-point 2 # ¶			End-point 3 ‖ **	
		151°-160°F.	161°-170°F.	Above 170°F.	Total time above 151°F.	161°-170°F	Above 170°F.	Total time above 151°F.	Above 170°F.	Total time above 151°F.
					4-Qt. Batches					
%	*lb.*	*min.*	*min.*	*min.*	*min.*	*min.*	*min.*	*min.*	*min.*	*min.*
9.5	5	0.3	1.3	0.8	2.4	1.2	3.5	4.9	6.3	7.8
9.5	10	0.2	1.2	0.4	1.8	1.6	1.4	3.2	3.3	5.1
12.5	5	0.9	1.5	0.8	3.2	2.1	1.6	4.6	4.0	7.0
12.5	10	—	0.4	—	0.4	1.4	1.0	2.4	1.9	3.3
					8-Qt. Batches					
9.5	5	0.9	2.4	2.1	5.4	2.4	3.3	6.6	7.3	10.6
9.5	10	0.8	1.3	—	2.1	2.5	2.3	5.6	5.5	8.8
12.5	5	1.3	2.7	0.5	4.5	4.1	1.5	6.9	2.7	8.1
12.5	10	1.4	1.5	0.7	3.6	2.7	1.5	5.6	3.0	7.0

*Means of two replications.
†Based on the weight of the milk.
‡Disappearance of raw starch taste.
#First substantial thickening.
¶The minutes at 151° to 160°F. were the same as for end-point 1 (1), cooked to the disappearance of the raw starch taste.
‖Definite linespread value.
**Minutes at 150° to 171° F. were the same as for end-point 1.

were the highly significant sources of variance affecting the time the temperatures in the mass were maintained at and above 151°F. (66°C.). The longer heating times were more common in the 8-qt. batches and in the batches cooked at 5 lb. steam pressure.

At the time of the first substantial thickening (end-point 2), the significant sources of variance that affected the time during which temperatures of the custards were maintained at and above 151°F. (66°C.) were, in order of decreasing importance: method of combining ingredients, batch size, steam pressure, and amount of egg. The longer heating times were usually found in the batches made by the two-step method, in 8-qt. batches, in batches cooked at 5 lb. steam pressure, and in the custards made with the lower amount of egg in the formula.

When the custards were cooked to a consistency as characterized by a definite linespread value (end-point 3), the significant sources of variance affecting the time during which temperatures of the custards were maintained at and above 151°F. (66°C.) were, in order of decreasing importance: method of combining the ingredients, amount of egg, batch size, and steam pressure. The conditions leading to longer heating times were the same as those at end-point 2.

When the sources of variance for the three-step method were analyzed for end-points 2 and 3, all of the sources of variance were significant or highly significant in affecting the time the temperatures of the custards were maintained at and above 161°F. (72°C.). The lower amount of egg in the formula,

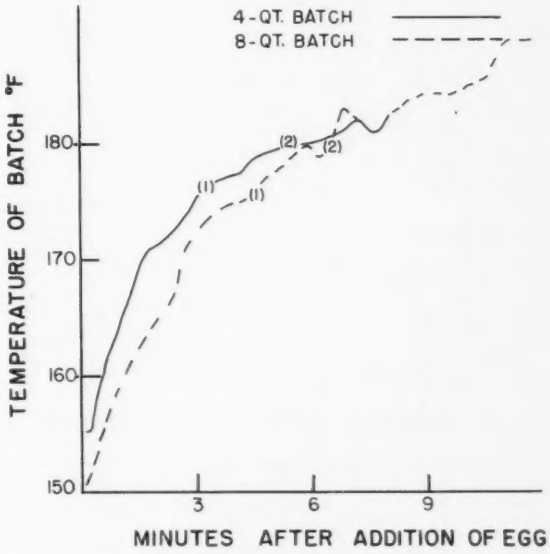

FIG. 1. *Effect of varying batch size on cooking time of comparable batches of custard cause cooked to three end-points: disappearance of the raw starch taste (1), the first substantial thickening (2), and a definite consistency.*

TABLE 2 Time* during which batches of custard sauce made by the three-step method of combining ingredients remained within certain temperature ranges at a location ½ in. from the surface while being cooked to two end-points

AMOUNT OF EGG†	STEAM PRESSURE	COOKING TIME				
		End-point 2‡			End-point 3 #¶	
		161°-170°F.	Above 170°F.	Total time above 160°F.	Above 170°	Total time above 161°F.
		4-Qt. Batches				
%	lb.	min.	min.	min.	min.	min.
9.5	5	—	3.4	3.4	6.7	6.7
9.5	10	—	0.9	0.9	3.9	3.9
9.5	15	—	0.6	0.6	1.8	1.8
12.5	5	0.6	1.0	1.6	2.4	3.0
12.5	10	—	1.5	1.5	1.9	1.9
12.5	15	—	0.6	0.6	1.5	1.5
		8-Qt. Batches				
9.5	5	0.3	1.3	1.6	4.2	4.5
9.5	10	0.3	2.7	3.0	6.6	6.9
9.5	15	1.7	1.3	3.0	4.3	6.0
12.5	5	0.2	1.0	1.2	1.9	2.1
12.5	10	1.2	0.3	1.5	1.5	2.7
12.5	15	—	0.7	0.7	1.8	1.8

*Means of two replications.
†Based on weight of milk.
‡First substantial thickening.
#Definite linespread value.
¶Minutes at 161° to 170°F. were the same as for end-point 2.

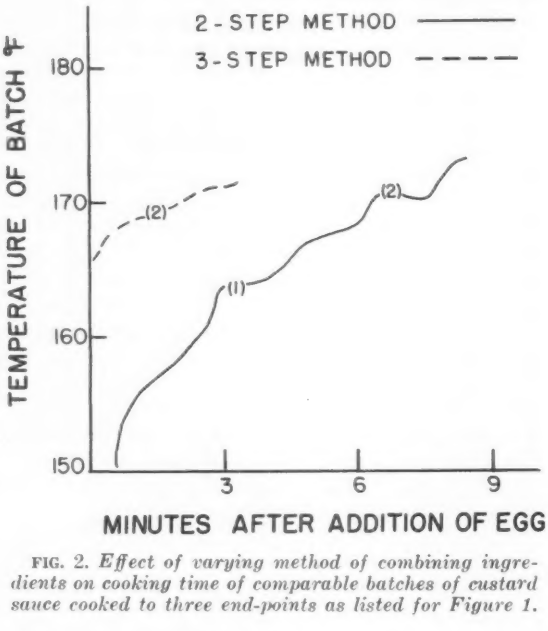

FIG. 2. *Effect of varying method of combining ingredients on cooking time of comparable batches of custard sauce cooked to three end-points as listed for Figure 1.*

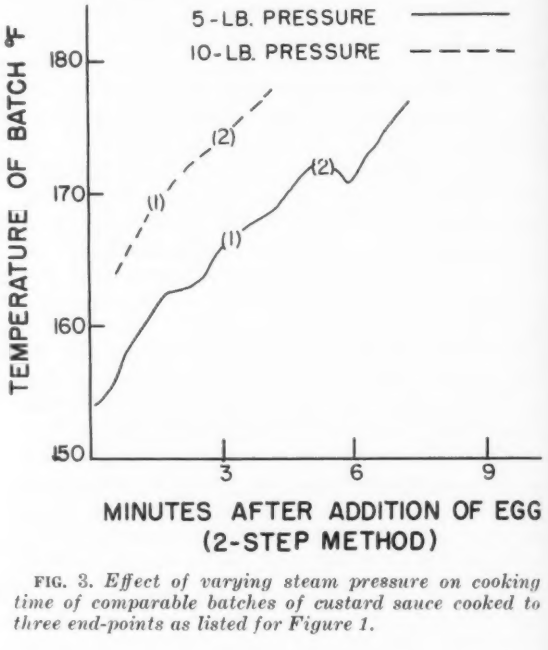

FIG. 3. *Effect of varying steam pressure on cooking time of comparable batches of custard sauce cooked to three end-points as listed for Figure 1.*

the 8-qt. batch size, and the 5 lb. steam pressure tended to prolong the cooking times.

Discussion and Conclusions

The differences in the cooking time of custards cooked at 10 and 15 lb. pressure were negligible; these custards cooked much more quickly than the batches cooked at 5 lb. steam pressure. From these results, it would appear desirable to maintain a low steam pressure to prolong the cooking time.

The size and design of the steam-jacketed kettle are of considerable importance, because they influence the ratio of heating surface to the mass of the custard. In this study, the 4-qt. batch filled the steam-jacketed area approximately half full, and the 8-qt. batch was just within the jacketed area.

It must be remembered that the method of agitation is an individual matter with each cook and that with larger kettles other methods of agitation, such as a constant circular motion around the kettle, might be more convenient. This method would probably not be as effective in bringing the warmer portion of the sauce from the bottom of the kettle to the surface as the up-and-down method used here. Temperatures at the surface would probably be somewhat cooler than those recorded in this study.

The determination of the second and third end-points of cooking was subjective for end-point 2 and partially subjective for end-point 3. It was difficult to determine the second end-point, which was based on resistance to stirring, because the process of thickening was usually quite gradual and the worker's arm became less sensitive with fatigue. Because of the danger of curdling, the linespread value for the final consistency (end-point 3) was 35 mm. or slightly less. Custards of a consistency characterized by this value had previously been judged as very acceptable by a panel (1). In this study, the custards curdled almost immediately after reaching end-point 3.

The statistical analyses are based on the periods when the temperatures in the custard sauce during cooking were maintained at and above 151°F. (66°C.) or at and above 161°F. (72°C.). These were the lowest temperatures found in the custards. The temperatures of the sauces were frequently higher. Temperatures were recorded ½ in. from the surface, but temperatures at the bottom and sides of the kettle were considerably higher. The temperatures in the area less than ½ in. from the surface of the sauce were probably lower.

Evaluation of the data involves the factors affecting the length of the cooking time at and above 151°F. (66°C.) and the temperatures attained during the cooking period. Each of the three end-points of cooking used in this study might conceivably be used as the end-points of cooking in a quantity food preparation situation.

In general, the temperatures recorded in the custards cooked in the steam-jacketed kettle were considerably higher than those recorded in the custards cooked in the bain marie (1), but the heating times were considerably shorter.

Since the method of combining the ingredients was the most significant factor in prolonging the heating times of the custards, an evaluation of the

two methods seems desirable. In both methods, the cooking time was comparatively short, but the three-step method resulted in cooking times that might prove to be dangerously short. It was observed that the custards cooked to end-point 3 curdled almost immediately; therefore, a cook would probably discontinue the cooking process at the first substantial thickening (end-point 2) and this would tend to shorten the brief cooking times even more.

Available data (3) on thermal death time-temperature relationships are inadequate in making possible predictions about bacteriologic safety of custards made in a steam-jacketed kettle.

The importance of follow-up studies on thermal death time-temperature studies in custard sauces using temperatures higher than 150°F. must again be emphasized. Only when such studies have been completed, can these data be fully evaluated.

Summary

This study was conducted to investigate the time-temperature relationships in custard sauces cooked to three end-points.

Two completely randomized replicates of an incomplete block design were carried out. A 12-qt. steam-jacketed kettle was the source of heat. The variables were: the batch size (4 and 8 qt.); the amount of egg (9.5 and 12.5 per cent, of the weight of the milk); the method of combining ingredients (two and three steps); and the steam pressure (5 and 10 lb. with the two-step method, and 5, 10, and 15 lb. with the three-step method).

Temperatures were recorded electronically in the custards throughout the cooking period from the time the egg was added to the mixture. Cooking times for the three end-points were noted.

Custards cooked until the raw starch taste disappeared in batches made by the three-step method of combining ingredients cannot be considered as custards, because the egg had not yet been added.

With the two-step method of combining ingredients, conditions leading to prolonged cooking times at and above 151°F. (66°C.) were: large batch size and low steam pressure. None of the conditions used appeared to effect a difference in the temperatures of the custards.

When custards were cooked until the first substantial thickening occurred, the conditions leading to prolonged cooking times at and above 151°F. (66°C.) were: the large batch size, the lower amount of egg, the two-step method of combining ingredients, and low steam pressure. None of the conditions used appeared to effect a difference in the temperatures of the custards.

When custards were cooked to a definite consistency, the conditions leading to prolonged cooking times at and above 151°F. (66°C.) were: the large batch size, the lower amount of egg, the two-step method of combining ingredients, and low steam pressure. None of the conditions used appeared to effect a difference in custard temperatures.

In evaluating the possible bacteriologic quality of these custards, no definite conclusions can be drawn. Thermal death time-temperature studies using heat-resistant strains of Salmonella in a custard sauce substrate and temperatures higher than 150°F. must follow this study.

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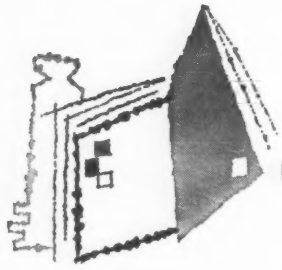
Strontium-90 from Fallout in Relation to Milk

Strontium-90 in soils arising from the testing of atomic weapons is readily absorbed by plants such as those eaten by milk cows. The transferal of this radioactive element from feed to milk has been said to be a potential hazard to man. As strontium tends to accompany calcium in its biologic pathway it is useful to correlate the two elements in dietary studies.

The ability of the cow to discriminate against strontium-90, as she utilizes dietary calcium, was measured by comparing the ratios of strontium-90 to calcium in the feed and water intake and in the milk produced therefrom in a study reported from England by Cox *et al.* The amount of strontium-90 secreted in the milk was 1.2 per cent of the total ingested. Strontium radioactivity as related to calcium content of the milk was of the order of one-tenth that in the feed.

Human consumption of the plants, themselves, in regions where fission products are accumulating could become an earlier hazard than the consumption of the milk because of this screening effect.—*Abstracted from "Strontium-90 from Fallout in the Diet and Milk if a Dairy Herd" by G. W. Cox, A. Morgan, and R. S. Taylor. J. Dairy Research 27: 47, 1960. Contributed by Frank E. Rice, Ph.D., Adviser in Food and Nutrition to the Dairy Society International, Chicago.*



BOOK REVIEWS

World Review of Nutrition and Dietetics. Edited by Geoffrey H. Bourne. Philadelphia: J. B. Lippincott Company, 1960. Cloth. Pp. 272. Price $12.

This review introduces a new and valuable yearly contribution for not only keeping us up-to-date but for giving us perspective and background on pertinent topics and areas of research in nutrition. Since a preface is a most important statement of an author or editor in giving his very own intent of his publication, some ideas and quotations are essential and informative. "In common with many other scientific subjects, that of nutrition becomes more and more difficult to envision as a whole because of the avalanche of published papers which envelops every worker in this field." In spite of the splendid review journals and abstracts in America, the United Kingdom, and Europe, the editor and his international advisory editors hope "to provide a forum for more lengthy and discursive reviews—not to be a catalogue of the papers published in the last few years. Each one will be written by an expert in the particular field—and should provide a critical evaluation of the field. We hope it will bear the imprint of the author himself, that is to say his interpretation, his views and his theorizing will be welcomed as an integral part of his article."

This annually published volume of review articles will be truly international, as is this first one containing papers from United Kingdom, France, Guatemala, Japan, and U.S. Listing the papers and authors seems the best method for describing the present publication and of predicting the future.

"The History of Nutrition"—E. V. McCollum, Professor Emeritus, Johns Hopkins University, Baltimore

"Effects of Androgens and Oestrogens on the Metabolism of Proteins and Growth Tissues"—Drs. P. Aschkenasy-Lelu and A. Aschkenasy, Centre National de la Researche Scientifique, Paris

"The Biosynthesis of Vitamin C"—Professor C. G. King and Dr. R. R. Becker, Columbia University, New York

"Treatment and Prevention of Kwashiorkor"—Drs. M. Behar, R. Bressani, and N. S. Scrimshaw, Institute of Nutrition of Central America and Panama, Guatemala City

"Basal Metabolism in the Japanese Population"—Dr. Shinjiro Suzuki, National Institute of Nutrition, Tokyo

"Nutritional Significance of Vitamin B_{12}"—Dr. M. R. Spivey Fox, National Institute of Arthritis and Metabolic Diseases, Bethesda, Maryland; and Dr. B. F. Chow, Johns Hopkins University

"Nutritional Factors in Anaemia"—Dr. G. R. Wadsworth, London School of Hygiene and Tropical Medicine

"Neoplasia and Nutrition"—Dr. T. A. McCoy, The Samuel Roberts Noble Foundation, Ardmore, Oklahoma

"The Use of Isotopes in Nutrition Research with Special Reference to Tritium"—Dr. J. Done and P. R. Payne, National Institute of Medical Research, London

"The Nutritional Requirements of Embryos and the Repercussions of Deficiencies"—Dr. A. Giroud, Labortoire d'Embryologie, École de Medicin, Paris

One contribution has been selected for emphasis and indication of scope and value of each review. Professor E. V. McCollum, in "The History of Nutrition," has given the ground work and evaluation of great pertinence to dietetics. This review and interpretation would contribute depth of understanding of food habits here and in underdeveloped countries to many who may have overconcentrated on "keeping up-to-date."

Two quotations from this superb review indicate the valuable content and interpretation: "The path to success in the management of one's life so as to promote optimum physical development prenatally and from birth to maturity, the maximum attainable preservation of vitality in middle life and the deferment of the tissue changes accompanying senile deterioration, lies in application of all available knowledge of foods in sound systems of dietetics." Furthermore his final statement challenges our profession: "This newly gained body of facts is of universal benefit to mankind. Its application represents the greatest achievement in the history of preventive medicine. Dietetics ranks with immunization against contagious diseases, sanitation and quarantine as a health measure."

There are excellent bibliographies for each review and an index for the volume.

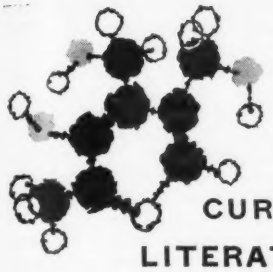
The *World Review of Nutrition and Dietetics* will furnish depth and breadth in knowledge and appreciation of values in research and its application for all who are interested in the fundamentals of dietetics. Personal and institutional libraries should start with Volume I and continue building this library of small gems of international and historic nutrition.—*Helen A. Hunscher, Ph.D., Head, Department of Home Economics, Western Reserve University, Cleveland.*

Foods without Fads. By E. W. McHenry. Philadelphia: J. B. Lippincott Company, 1960. Cloth. Pp. 159. Price $3.50.

The author is Head of the Department of Nutrition, School of Hygiene, University of Toronto. His book, which is for the lay person, was developed from talks and newspaper and magazine articles he has written to help combat widespread food misinformation. One chapter, "Food Nonsense Is a Nuisance," offers excellent suggestions to use in evaluating "popular nutrition" material, much of which promotes food fads. The body's needs for foods are described, followed by a discussion of the importance of each of the basic food groups in the daily diet. Meal planning, feeding of children, adults, and older people, and weight control are other topics covered.

This down-to-earth approach is one that can be recommended to those who want common sense information about nutrition. Little spots of humor brighten the book and make entertaining as well as educational reading.

This reviewer was naturally disappointed to see "an excellent leaflet on food fads and nonsense" attributed to another organization, since The American Dietetic Association was the issuer of the copyrighted booklet in question, *Food Facts Talk Back.—Dorothy J. Bates, Organizational Liaison Director, The American Dietetic Association, Chicago.*



CURRENT LITERATURE

Contributed by Janette C. Carlsen, The Johns Hopkins Hospital, Baltimore; Clara Karl Frederick, Lombard, Illinois; Margene A. Wagstaff, Elmhurst, Illinois; the following staff dietitians of Charity Hospital, New Orleans: Janet Blackburn, Ruth Cayer, and Enilda Rodriquez; the following dietetic interns at the Veterans Administration Center, Los Angeles: Nancy L. Alcorn, Connie Eckman, Mary Flick; Marilyn Givens, Carolyn Henricks, Kristin Holmberg, Rochelle Howard, Karen Mund, and Nadyne Rhinelander; and the Journal staff.

THE AMERICAN JOURNAL OF CLINICAL NUTRITION

Vol. 8, September-October, 1960

*Nervous regulation of food intake. B. K. Anand.—p. 529.

*The hypothalamic control of gastric hunger contractions as a component of the mechanism of regulation of food intake. J. Mayer.—p. 547.

*Satiety signals. M. I. Grossman.—p. 562.

*Appetite in man. W. W. Hamburger.—p. 569

*Biochemical concomitants of hunger and satiety in man. T. B. Van Itallie and S. A. Hashim.—p. 587.

A method of studying physical activity in man. A. Stunkard.—p. 595.

*Human energy expenditure studies in the National Institute of Arthritis and Metabolic Diseases Metabolic Chamber. I. Interaction of cold environment and specific dynamic effect. II. Sleep. E. R. Buskirk, R. H. Thompson, R. Moore, and G. D. Whedon.—p. 602.

The effect of insulin on adipose tissue. R. J. Barrnett and E. G. Ball.—p. 666.

The etiologic mechanism of some forms of hormonally induced obesity. F. X. Hausberger and B. C. Hausberger.—p. 671.

*Effects on metabolism produced by the rate of ingestion of the diet. "Meal eating" versus "nibbling." C. Cohn and D. Joseph.—p. 682.

Some hormonal influences on fat mobilization from adipose tissue. F. L. Engel and J. E. White, Jr.—p. 691.

*Factors affecting fat mobilization from adipose tissue. E. Wertheimer, M. Hamosh, and E. Shafrir.—p. 705.

The obese hyperglycemic syndrome of mice as an example of "metabolic" obesity. J. Mayer—p. 712.

Factors concerned with the regulation of fatty acid metabolism by adipose tissue. G. F. Cahill, Jr., B. Leboeuf, and A. E. Renold.—p. 733.

*Non-esterified fatty acids in the blood of obese and lean subjects. E. S. Gordon.—p. 740.

Comments on the genetics of human obesity. A. G. Steinberg.—p. 752.

*Overfeeding as a stress. G. C. Kennedy.—p. 767.

Nervous Regulation of Food Intake. The nervous mechanisms regulating food intake are discussed. Experimental evidence suggests that they can be categorized with those governing the nervous regulation of other visceral activities. A simplified explanation could be that, when food is eaten, certain changes occur within the body which either directly or indirectly affect the hypothalamic centers and possibly the higher cerebral centers. These changes stimulate the activity of the medial or inhibiting hypothalamic mechanisms and suppress the lateral facilitating mechanisms, thus producing satiety. When the food eaten is disposed of through conversion to heat, work, or some form of stored energy, activation of the satiety mechanism is removed and the lateral facilitating mechanism becomes active, leading to a state of hunger. Various suggestions have been made regarding the nature of the change or changes, produced as a result of feeding, which influence the regulating system. Included in these suggestions are the thermostatic regulation of food intake, the chemostatic regulation of food intake and gastric afferent impulses. More knowledge is required, however, before a complete picture of the nervous regulation of food intake is finally revealed.

Hypothalamic Control of Gastric Hunger Contractions. Modern behavioral methods make possible the study of gastric contractions in relation to hunger behavior in animals as well as in man. Gastric hunger contractions appear to be, at least in part, under hypothalamic control. One area involved is the ventromedial area which is sensitive to the metabolic state of the individual. A factor in this control may be the rate of glucose utilization by the ventromedial area of the hypothalamus.

Satiety Signals. Many factors are concerned in producing satiety or cessation of eating. Among these are a stomach distended either by food or non-nutritious substances and, over a relatively long period of time, energy balance. On the other hand, food that has left the stomach, secretion of enterogastrone, or large amounts of intravenous glucose appear to have no effect on satiety. Although it has been postulated that the inhibition of feeding reflexes are carried through the hypothalamic portion of the brain, neither the precise pathways that mediate satiety nor the interrelation of the many factors causing cessation of eating are known.

Appetite in Man. Hunger and appetite, as regulators of food intake in man, are compared and contrasted. It is proposed that the term, "hunger," be applied only to biochemical and physiologic processes; "appetite" only to psychologic regulations. Hunger is discussed as an instinct, appetite as a drive, and both at varying levels of consciousness. Appetite subsumes all affective, perceptual, ideational, and conative regulations of food intake. Appetite, as a function of man's mind, is interposed between the internal, metabolic demands of hunger and appetitive and consummatory behaviors directed to the environment. The regulation of food intake in man can be fully understood only if man, as adult and child, is studied. This is due to man's phylogenetically unique cerebral cortex which permits mental representations of drives and, therefore, introspective, subjective perceptions of appetite which must be included in the study of nutritional regulations. Emphasis is given to limbic and neocortical aspects of the regulation of food intake by concomitant and integrated physiologic and psychologic processes. The manifest nutritional behaviors of hyperphagia and hypophagia are often a substitute gratification for other needs which are non-nutritional in origin. Such distortions and substitutions are termed the psychopathology of appetite and usually occur at unconscious levels of awareness. Dr. Hamburger's studies of dreams of food and eating are elaborated. These appear to be a useful method of psychoanalytic research for studying unconscious aspects of oral urges, food and eating behaviors. Emphasis is given to studying separately metabolic needs, oral urges, food intake, and eating behaviors.

Hunger and Satiety in Man. Some biochemical concomitants were studied as a possible influence on states of hunger and satiety in man. In subjects on self-selected mixed diets, a good correlation was obtained between diurnal changes in arteriovenous glucose differences and non-esterified fatty acids (NEFA). Appreciable increases in arteriovenous glucose differences were associated with reciprocal changes in NEFA levels. The hunger-satiety pattern paralleled the pattern of NEFA change. When the subjects were changed to carbohydrate-poor diets, arteriovenous glucose differences remained negligible throughout the day. The change of pattern of NEFA tended to parallel the hunger-satiety pattern. It is probable that NEFA levels *per se* do not act directly as a signal to the food regulatory center. However, the pattern of NEFA change may provide a useful index of the physiologic readiness of the body to consume more food.

Human Energy Expenditure. The interaction of cold environment and specific dynamic effect and of sleep were studied in relation to human energy expenditure. In a re-investigation of one phase of the classical work of Rubner on specific dynamic effect, it was found that the increment in heat production associated with eating a 1000-calorie meal (400 protein calories) and the increment associated with exposure to cold showed summation when humans were fed while resting in the cold. The two dogs studied by Rubner reacted differently; heat produced after eating meat simply replaced the production of heat that would normally have occurred with exposure to cold. The dogs ap-

parently shivered less after eating, and their critical temperature was lowered. In contrast, no change was observed in the shivering response in the human subjects after they ate in a cold environment. Changes in metabolism during sleep suggested a relationship between the level of oxygen consumption for the night hours and the basal rate. If night time metabolic rate was high, so also was the basal rate.

Effect of Ingestion Rate on Metabolism. The effects on metabolism produced by the rate of ingestion of the diet, meal-eating vs. frequent small feedings, were studied. Animals induced to eat meals differed from those allowed to nibble with respect to overall body metabolism. Meal-eating, when compared with nibbling, was associated with the following: (a) increased body fat, (b) decreased body protein, (c) changed tissue enzymatic activities, (d) altered thyroid activity, (e) an increased incidence of diabetes in partially depancreatized rats, and (f) an enhanced development of and an inhibition in the regression of experimental atherosclerotic lesions. These results are interpreted to be the result of a role the rate of ingestion of the diet plays in regulating intermediary metabolism. It is believed that the rate of influx of calories alters traffic over specific enzymatic pathways, when multiple pathways are available; hence it affects the metabolism of fat, carbohydrate, and protein.

Factors Affecting Fat Mobilization. Factors affecting fat mobilization from adipose tissue were investigated. Some of the factors considered were epinephrine, low temperatures, endotoxin, insulin, and hormones. The interplay of the hormones, insulin, and epinephrine appears to be crucial in determining the extent and the pattern of the metabolism of adipose tissue and, by the same token, in regulating the energy metabolism of the body as a whole. A somewhat speculative scheme of metabolic interrelations in the adipose tissue, which may help to clarify the mechanism by which the impairment in glucose metabolism causes an increased release of unesterified fatty acids, is shown in diagram form and discussed.

Fatty Acids in Obese and Lean Subjects. This paper deals with investigations of fat mobilization and utilization under fasting conditions in fat and thin subjects. Nonesterified fatty acids (NEFA) in the blood were measured. Normal healthy subjects of average body build showed a progressive rise in NEFA concentration. Thin subjects, usually hyperkinetic, and who are able to consume high caloric diets without any tendency to gain weight, showed much steeper rises in NEFA. Obese subjects, in general, showed markedly elevated levels in the beginning of the test period which tended to remain essentially flat curves. Certain obese subjects, who are clearly overweight because of constant excessive food intake, showed NEFA curves that seem intermediate between the flat plateau and the usual steady rise. They can lose weight quite easily when caloric intake is restricted. Curves from four "resistant obese" subjects showed the characteristic flat curve at an elevated level. Because of the dynamic nature of lipid metabolism, and especially because of the highly labile state of the NEFA fraction, it seems possible that the circulating level at any moment represents an algebraic summation of the rate of delivery from fat stores to the circulation and the rate of peripheral utilization of fatty acids for metabolic needs. Hence, a rising level might be due to an accelerated rate of mobilization, a decreased rate of utilization, or both. While a plateau of NEFA could be attributed to a failure of mobilization, it might also be interpreted as a rapid rate of mobilization balanced by an equally rapid rate of utilization.

Overfeeding as a Stress. Apart from adiposity, overnutrition causes metabolic and structural adaptations in a variety of tissues. Although initially beneficial, such adaptation may finally predispose to pathologic changes. It is suggested that prolonged overproduction of insulin may be a factor in the increased incidence of diabetes in obesity. Possible causes for abnormal tubular hyperplasia observed in the kidneys of obese rats are considered in relation to the frequency of renal diseases in obese animals.

THE AMERICAN JOURNAL OF GASTROENTEROLOGY

Vol. 34, October, 1960

*Experimental and clinical considerations on hesperidin-ascorbic acid in upper gastrointestinal bleeding. T. Bodi and B. Weiss. —p. 402.

Upper Gastrointestinal Bleeding. At Jefferson Medical College Hospital, Philadelphia, an experimental and clinical study was done to find the effect of a combination of hesperidin (a flavonne glycoside) and ascorbic acid on gastric hemorrhage. In the experimental subjects, bleeding was induced in healed-ulcer patients by administration of histamine-insulin. Evaluation of both experimental and clinical patients was by administration of strict ulcer diets and response to the hesperidin-ascorbic acid combination—100 mg. of each for varying intervals. The clinical patients also received antacids. In the experimental group, this combination did not seem to have an acute protective effect, but in the clinical group, the combination seemed to be helpful.

AMERICAN JOURNAL OF PHYSIOLOGY

Vol. 199, September, 1960

*Effect of fasting, epinephrine and glucose and insulin on hepatic uptake of nonesterified fatty acids. M. B. Fine and R. H. Williams.—p. 403.

*Depressed lipogenesis induced by cold stress. E. J. Masoro.—p. 449.

Hepatic Uptake of Nonesterified Fatty Acids. Catheters placed in the portal and hepatic veins of dogs were maintained there for two to four weeks, during which epinephrine, glucose, and insulin were administered independently. One group of dogs was fed, the other fasted for 36 to 40 hr. The fasting dogs had a considerably higher nonesterified fatty acids (NEFA) level. The rise in plasma NEFA with fasting was associated with a significantly increased hepatic NEFA uptake, although the percentage of hepatic extraction of NEFA was not increased. Epinephrine produced the same results. When glucose and insulin were administered, however, the opposite effect was obtained. Thus it seems that changes in hepatic NEFA uptake are related not to the effect of the test conditions on the liver itself, but to the NEFA concentration in the blood reaching the liver. It would seem that the liver extracts small amounts of NEFA from blood containing low levels, and larger amounts from blood which is rich in NEFA. If the changes in hepatic NEFA were the result of hormonal influence on hepatic fat metabolism, one would expect to observe a change in the percentage hepatic NEFA uptake. Thus it would seem that the role of the liver in fat metabolism is essentially one of maintaining homeostasis.

Influence of Cold on Fat Metabolism. Liver homogenates prepared from control, cold-fed, and cold-fasted rats indicated that the control and cold-fed rats synthesized fatty acids to approximately the same extent. Cold-fasted rats synthesized far less, probably due not to a lack of fatty-acid synthesizing enzymes but to an unfavorable cofactor environment. The experiment points out that the depressed lipogenesis observed both in cold-fed and cold-fasted rats is probably the result of decreased TPNH generation. The decreased rate of lipogenesis in the cold-fasted rats appears to result from quite a different cause from that in the cold-fed rats. The low rate of lipogenesis in the liver of cold-fasted rats appears to be due to a loss of fatty acid-synthesizing enzymes, although the possibility that this defect is related to the lack of some unidentified cofactor cannot be discounted.

AMERICAN JOURNAL OF PUBLIC HEALTH

Vol. 50, October, 1960 (Supplement)

Epidemiology of cardiovascular diseases methodology. Hypertension and arteriosclerosis.

*Subcommittee on Methodology for Diet Appraisal. M. Trulson.—p. 39.

*Subcommittee on Methods for Acquiring Information on Physical Activity and Body Form. H. S. Belding.—p. 52.

*Subcommittee on Biochemical Measurements. F. Kendall.—p. 67.

Methodology for Dietary Appraisal. Dietary surveys growing out of a suspected relationship between diet and atherogenesis have increasingly be-

come an integral part of the design of cardiovascular epidemiologic studies. The Subcommittee on Methodology for Diet Appraisal examined the existing procedures for collecting and processing information on food intake, studied the deficiencies in current procedures, and made recommendations for further research. The principles of dietary studies in use in epidemiologic investigations are described. Decisions which must be made in planning dietary studies are also discussed. Recommendations include assembling of published and unpublished work relating to methodology of dietary appraisal, preservation of the original dietary data, continued work on methods of chemical analysis, food composition tables, classification and patterns of food usage, standardization of the processing of dietary data, and further research. It is proposed that a short, simple method for obtaining dietary information be used in epidemiologic studies.

Physical Activity and Body Form. Sufficient suggestive evidence has been collected of a relationship between level of physical activity and development of cardiovascular disease to encourage numerous hypotheses regarding the mechanisms involved. Further epidemiologic studies are needed to define better the relationship. This subcommittee considered means by which the physical activity and body form of population groups or of individuals within such groups could be assessed. Measurements of body form are proposed for use in epidemiologic studies. Among the recommendations are methods for determining blood pressure during work, for monitoring and recording blood pressure and heart rate over extended periods, and for predicting maximum oxygen utilization without requiring maximum work.

Biochemical Measurements. Biochemical measurements are important in the analysis of dietary intake, in the analysis of the relationship of physical activity to cardiovascular diseases, and in diagnostic studies in general. This subcommittee has considered the place of biochemical measurements in epidemiologic studies, has set up criteria for judging the suitability of any specific biochemical measurement for such a study, has outlined the procedures required to achieve comparability of measurements made in various participating laboratories throughout the duration of the study, and has recommended a plan for implementing a system of controls necessary to achieve this comparability between laboratories. It is believed that this recommendation would be done best by establishing a control laboratory.

THE AMERICAN JOURNAL OF SURGERY

Vol. 100, October, 1960

*Cholecystostomy in the aged. R. E. Condon and L. M. Nyhus.—p. 544.

Cholecystostomy in the Aged. As palliative therapy in patients with carcinoma involving the structure of the porta hepatis, thirty-eight cholecystostomies were performed on patients ranging in age from forty to ninety-eight years. One operation was performed for biliary decompression during the management of severe pancreatitis with formation of pseudocysts. Previous gastrointestinal symptoms were denied by half the patients, but 53 per cent gave a definite history of symptoms consistent with chronic gallbladder disease. Pain was the chronic symptom, being present to some degree in three-fourths of those patients who were symptomatic. Fewer patients had experienced postcibal fullness and eructation or intolerance to specific fatty foods. Anorexia occurred in 82 per cent, nausea without vomiting in 74 per cent, and vomiting in 53 per cent. Patients' management, both postoperative and operative, is analyzed in detail. Mortality rate was 13 per cent after surgery. There were no operative deaths. Recurrent mild symptoms of chronic cholecystitis developed in 53 per cent, i.e., postprandial fullness and belching, continued intolerance to fatty foods, and, most importantly, mild post-prandial attacks of right upper abdominal tenderness, colic, or aching. In the majority, the recurrent symptoms appeared within a month after surgery and in all within the first year. Subsequent interval cholecystectomy is not recommended in aged patients considered poor surgical risks if they remain asymptomatic following cholecystostomy.

ARCHIVES OF PEDIATRICS

Vol. 77, October, 1960

*Intramuscular iron in the prophylaxis of anemia in premature infants. H. Larsen. —p. 423.

Intramuscular Iron and Premature Infants. Oral iron medication has been used for many years in the prophylaxis of anemia in premature infants. The introduction in 1954 of an iron dextran complex (Imferon) for intramuscular use may also have a role. Of 131 premature infants in this study, 70 were treated with Imferon intramuscularly (75 mg.). In addition, all the premature infants were treated with oral iron therapy (250 mg. ferro lactate daily). Complications were not observed during or after treatment. At three, six, and nine months, a slight anemia was found in both groups. No significant difference in hemoglobin values was found between the two groups. It may be concluded that the effect of oral and parenteral iron treatment is the same and that a combined therapy with both oral and parenteral administration does not yield more than either of the two therapies alone. In suitable cases, it seems reasonable to replace prophylactic oral iron treatment with Imferon given intramuscularly.

THE BRITISH JOURNAL OF NUTRITION

Vol. 14, No. 3, 1960

*Vitamin A and vitamin E in human blood. 2. Levels of vitamin E in the blood of British men and women, 1952-7. A. Z. Leitner, T. Moore, and I. M. Sharman.—p. 281.

*The availability of lysine in groundnut biscuits used in the treatment of kwashiorkor. K. M. Clegg.—p. 325.

*The metabolism of nitrogen, calcium and phosphorus in undernourished children. 6. The effect of partial or complete replacement of rice in poor vegetarian diets by kaffir corn *(Sorghum vulgare.)* P. P. Kurien, M. Narayanarao, M. Swaminathan, and V. Subrahmanyan.—p. 339.

*Nutritional status and food consumption of pregnant women in a development area of Israel. K. Guggenheim, J. Ilan, T. Vago, and G. Mundel.—p. 347.

*Changes in body-weight of men in the Antarctic. O. Wilson.—p. 391.

Vitamin E in Human Blood. Mean value of vitamin E in blood expressed as alphatocopherol was 1.05 mg. per 100 ml. serum. Considerable individual variations were found for both sexes. Sex differences were less consistent than for vitamin A or carotenoids. When all ages were combined for each sex, no difference between the means was found. However, levels tended to be higher in women than in men at ages under thirty and over sixty-nine years, and higher in men between these ages. The variations in vitamin E according to age and sex were similar to those known to hold for total cholesterol and phospholipids, but differed from those shown by vitamin A.

Availability of Lysine in Peanut Biscuits. Malnourished children being treated in Uganda received biscuit meals made largely from groundnuts (peanuts), with smaller quantities of maize and wheat flours, cottonseed oil, sugar, and skim milk powder. The available lysine was measured in various biscuit mixtures. The cooking of skim milk powder with the other ingredients reduced the available lysine by about one-third. The damage was probably caused chiefly by the lactose of the powder.

Nutritional Value of Kaffir Corn. The effects of partial or complete replacement of rice in a poor Indian diet by kaffir corn on the metabolism of nitrogen, calcium, and phosphorus in children were studied. The daily nitrogen intake was nearly the same with all of the diets. The apparent digestibility coefficients of the protein and the mean daily nitrogen retentions diminished as the proportion of kaffir corn in the diet was increased. All were in positive nitrogen balance. Although the addition of kaffir corn led to a higher calcium intake, the amount of calcium retained decreased as the proportion of kaffir corn in the diet was increased. Kaffir corn also provided a higher phosphorus intake, which resulted in a higher phosphorus retention.

Nutrition of Pregnant Women in Israel. Food habits, social conditions, and nutritional status of immigrant

pregnant women living in one of Israel's development areas were studied. The general level of consumption of nutrients was considered as border-line between good and fair, but the intake of calcium and vitamin A of about half the women was definitely inadequate, if judged by British recommendations. The statutory enrichment of flour with soybean meal, calcium, and riboflavin contributed significantly to the calcium and riboflavin intake. An increased consumption of milk and milk products, a shifting over from white to dark flour, and a proper choice of fruits and vegetables should be encouraged.

Weight of Men in the Antarctic. The body-weights of men were recorded during two years in the Antarctic, as well as before and after their return. During the first polar winter, the general increase in weight was 2.7 kg.; it was 5.3 kg. during the second winter. There was a marked seasonal fluctuation in weight—high in the winter (July) and low in the summer. The seasonal winter rise is attributed to the sedentary indoor life necessary during the polar night and is not regarded as a function of cold acclimatization. The mean weight loss during sledging was not large and was probably mainly loss of body water. The higher weight level observed during the second winter may be a sign of adaptation to activity and climate. A gain of 3 kg. was still evident after the return to a temperate climate.

FOOD AND NUTRITION NOTES AND REVIEWS (Australia)

Vol. 17, May-June, 1960

*Scurvy in our midst. E. K. Turner.—p. 37.
*How is vitamin C destroyed? F. E. Huelin. —p. 39.

Scurvy in Victoria. Scurvy is a pure deficiency disease. It is generally not associated with severe malnutrition, nor with diets which are grossly deficient in many factors, but tends to occur among the usually well nourished. As far as can be ascertained from the figures available, Australia leads the world in the incidence of infantile scurvy—this in spite of a constantly active and widespread health educational program. Of all the states in Australia, Victoria has the largest number of cases, and yet the scope and industry of health welfare organizations in Victoria is second to none. A more vigilant educational campaign is advocated to offset the ignorance and neglect which is causing so much unnecessary suffering in infants. Consideration has been given to the possibility of the addition of ascorbic acid to milk formulas and infant foods, but this has not been received favorably. It may be necessary to provide free orange juice, as is the practice in Great Britain, or to urge that multivitamin preparations be available free. It has also been suggested that scurvy be made a notifiable disease, in order to focus more attention on the number of cases.

Destruction of Ascorbic Acid. Ascorbic acid occurs in foods in the reduced and oxidized forms. The reduced form accounts for practically all the ascorbic acid in fresh fruits and vegetables. It is comparatively stable in the absence of air, but can be oxidized by atmospheric oxygen to dehydroascorbic acid. The latter is converted rapidly, even in the absence of air, to inactive diketogulonic acid which is devoid of ascorbic acid activity. Dehydroascorbic acid is usually neglected in determining ascorbic acid in canned foods as most of it is destroyed during and shortly after the heating process. It could, however, contribute appreciably to the ascorbic acid content of frozen foods. The oxidation of ascorbic acid depends on the presence of atmospheric oxygen and on either traces of copper or on enzymes from the tissues.

FOOD RESEARCH

Vol. 25, September-October, 1960

*Changes in hydration and charges of muscle proteins, during freeze-dehydration of meat. R. Hamm and F. E. Deatherage. —p. 573.
*Influence of freezing and thawing on hydration and charges of the muscle proteins. F. E. Deatherage and R. Hamm.—p. 623.
*Studies on canned chocolate nut roll experimentally inoculated with spores of *Clostridium botulinum* types A and B. R. O. Wagenaar and G. M. Dack.—p. 646.
*Paper chromatographic identification and estimation of the free amino acids in thirty-two fruits. R. L. Silber, M. Becker, M. Cooper, P. Evans, P. Fehder, R. Gray, P. Gresham, J. Rechsteiner, and M. A. Searles. —p. 675.

Changes in Muscle Proteins during Freeze-Dehydration. The studies reported here concern the kind of biochemical changes in meat proteins caused by freeze-dehydration and do not concern the storage of dried meat. Freeze-drying of beef results in a drop of water-holding capacity only in the isoelectric *p*H-range of muscle. It causes a tighter network of protein structure, probably because the peptide chains after drying lie more closely together. The tighter structure may be stabilized by the formation of new salt and/or hydrogen bonds. Freeze-drying causes an increase of acidic groups of proteins in the basic but not in the acidic range of the isoelectric point. Probably this increase is due to a cleavage of metallic cross linkages between the protein chains. The undesirable changes in meat during freeze-drying are not due to the freezing process itself. Furthermore, these changes are not identical with the alteration of meat by heat denaturation.

Freezing and Thawing of Muscle Proteins. Various methods were used to determine whether freezing and thawing cause denaturation of muscle proteins. Quick-freezing and thawing of beef resulted in no considerable denaturation of muscle protein. Quick-freezing caused a very small but significant increase of the water-holding capacity of meat, probably by a mechanical loosening of tissue-structure due to the formation of tiny ice crystals inside the cells. Slow-freezing caused a significantly small decrease of the water-holding capacity of meat, probably due to some destruction of protein structure by formation of large ice crystals between the cells.

Chocolate Nut Roll and *C. botulinum*. A study was made to assess the botulism hazard of canned steamed chocolate nut roll of the composition desired for inclusion in military rations. Analytical determinations were made of the effect of varying concentrations of sucrose on growth and toxin production of *C. botulinum*. Most of the positive samples were from groups having moisture levels in excess of 42 per cent. All cans of chocolate nut roll of the composition usable for rations (27 per cent sucrose, approximately 29 per cent moisture) were negative for botulinum toxin at all analyses up to and including twelve months of storage at 90°F. Toxicity tests showed that in inoculated nut rolls having initial *p*H readings in the range 5.8 to 6.0 and moisture levels of near 40 per cent or lower were limiting to growth and toxin production of *C. botulinum* at all sucrose levels tested.

Free Amino Acids in Fruits. A survey of the free amino acids of some thirty-two fruits was made by means of paper chromatography. The number per fruit ranged from five for blueberries up to twenty-one amino acids for red grapes, white grapes, and pineapples. The amino acids and related compounds found in the greatest amounts are listed. The fruits containing the greatest number of free amino acids were: avocado, lemon, pineapple, red grape, white seedless grape, blue grape, and fig. Red raspberry, cherry, lime, mango, papaw, and plum contained only slightly smaller amounts. The fruits which appear to contain the least amounts of amino acids were: apple, blueberry, gooseberry, and rhubarb. In general, the grapes and tropical fruits, with the exception of most citrus, contained the highest number of amino acids.

FOOD TECHNOLOGY

Vol. 14, October, 1960

*Antibiotic preservation of beef with subsequent feeding to experimental animals. R. B. Sleeth, J. C. Armstrong, H. S. Goldberg, and H. D. Naumann.—p. 505.
*Nutritional and chemical changes occurring in heated fats: A review. E. G. Perkins. —p. 508.
*Consumer opinion of sweeteners in frozen concentrated lemonade and orange juice drink. R. M. Pangborn, G. L. Marsh, W. B. Channell, and H. Campbell.—p. 515.
*Experimental preservation of poultry by chlortetracycline and radiation. A. W. Phillips, H. R. Newcomb, and F. C. Bach. —p. 521.
*Time-temperature tolerance of frozen foods. 23. Quality changes in frozen spinach. W. C. Dietrich, M. M. Boggs, M. Nutting, and N. E. Weinstein.—p. 522.

Antibiotic Preservation of Beef. Raw and cooked meat containing low

levels of oxytetracycline (OTC), when fed over a period of sixteen weeks, did not cause any detectable residual in blood serum, heart, kidney or muscle of rats. Apparently, no significant changes occurred in the gut flora of rats following low-level exposure to OTC for sixteen weeks. On the basis of this study, the potential health hazard of the consumption of meat containing low levels of OTC would appear to be small.

Changes in Heated Fats. Practical research on the formation and accumulation of polymeric materials in oils obtained from deep-frying operations has not received enough emphasis in published work. Differences in the temperatures of heating and oxygen content can alter the rate and types of polymerization. The time that an oil is exposed to oxygen and heat, and especially the percentage of heated oil in the diet, seem to have as great a bearing on the nutritive value of the oil as temperature of heating. Most of the data derived from this type of research cannot be projected to predict whether an unsaturated oil will be damaged sufficiently during processing and commercial frying operations to be harmful. The data obtained are sufficient, however, to justify the suspicion that the use of such oils containing polymeric materials may not be desirable from a nutritional point of view. It is obvious that practical research must yet be done in order to answer at least three main questions: (a) Are polymers formed in unsaturated oils during deodorization, processing, and use? (b) Are polymeric materials absorbed on food products, and if so, to what extent? (c) What are the physiologic and nutritional effects of these materials?

Sweeteners in Frozen Citrus Drinks. Three surveys were conducted among 320 families to determine consumer opinion of amount and type of sweetener in frozen, concentrated lemonade and in frozen, concentrated orangeade. In Study I, an optimum sweetness level of 11° Brix at a Brix-acid ratio of 16 was established for lemonade, whereas 13° Brix at a Brix-acid ratio of 18.5 was optimum for the orangeade. Only the lemonade sample containing 30 per cent dextrose replacement was rejected by the consumers; all orangeade containing dextrose was acceptable. However, undesirable darkening was observed in all dextrose-containing samples after six months' storage at 0°F. Corn sirup was objectionable in lemonade, but inconclusive results were obtained for orangeade. The laboratory taste panel found that 9.8° Brix in the all-sucrose sweetened lemonade was equivalent in sweetness to 10.8 Brix in samples with sucrose replacements of 20 per cent dextrose or 20 per cent corn sirup. Sucrose had the greatest sweetening capacity and corn sirup had the least.

Preservation of Poultry. Ten p.p.m. chlortetracycline and 100,000 rads ionizing radiation were used in an experimental antibiotic-radiation process for retarding microbial spoilage in prepackaged fresh chicken meat. Treated meat was stored at 41°F. for seven weeks without microbial spoilage. Results obtained on meat independently treated with either radiation or antibiotic were inferior to those achieved with the combination process.

Time - Temperature Tolerance of Frozen Spinach. Time - temperature conditions ranging from one day at 40°F. to two years at −20°F. have been investigated for spinach with regard to changes in chlorophyll, ascorbic acid, carotene, reflectance color, visual color, and flavor. Significant deterioration did occur (except for carotene) above 0°F. within periods of handling that may be experienced in commercial practice. Comparison of change-in-percentage chlorophyll converted to pheophytin in spinach with the change in peas and green beans, for example at 10° and 20°F., showed conversion in spinach to increase one to two times as fast as in peas and one-half to one-quarter as fast as in green beans. Loss of ascorbic acid in spinach was one to two times as much as in green beans and peas under the same conditions. Some time-temperature effects caused enough deterioration for industry panels to rate samples as "sufficiently poor to cause consumer complaint." Data emphasize a large variation among 10-oz. packages of spinach and the need for adequate sampling for quality evaluation.

GASTROENTEROLOGY

Vol. 39, October, 1960

*Hepatitis and its treatment. W. H. J. Summerskill.—p. 510.

Treatment of Hepatitis. This article is a report on a panel discussion at the International Congress of Gastroenterology. Hepatitis is a disease that acts differently in each patient and the treatment must therefore be individual. Because of the individuality of response, it is difficult to know exactly what treatment should be. It is now agreed that modified diets are of secondary importance. A high content of protein (up to 120 gm. daily) and calories will hasten physical recovery, provided it is not contrary to neuropsychiatric disorder. Reduction in the fat content of the diet may improve palatability, but it has no physiologic effect. After evaluating the role of dietary constituents, exercise, and drugs in hepatic function and in the healing processes of the liver, physicians will be better able to evolve methods of treatment.

GERIATRICS

Vol. 15, October, 1960

*Vitamin K and hypoprothrombinemia of liver disease. F. Steigmann and K. Cohen.—p. 700.

Vitamin K. In this study of eighty-four patients with liver disease admitted to Cook County Hospital, twenty-five were diagnosed as severe. They were tested for prothrombin time and factor V and VII. If these values were below 50 per cent, the patients were given 72 mg. of water-soluble vitamin K, and prothrombin time was determined again in 24 and 48 hr. If little or no response was noted, 50 mg. vitamin K_1 (Mephyton) was given, and the prothrombin time determined. In some instances, 25 mg. Premarin was given to patients who showed no effect from water-soluble vitamin K or vitamin K_1 in oil emulsion. The results indicated that vitamin K in the foregoing doses does not decrease prothrombin time and in some cases may increase it. Some other factors found in whole blood or plasma seem to be necessary for lowering prothrombin time in patients with severe liver damage.

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

Vol. 174, October 15, 1960

*Infectious hepatitis. Studies on the effect of gamma globulin and on the incidence of inapparent infection. S. Krugman, R. Ward, J. P. Giles, and A. M. Jacobs.—p. 823.

*Protein metabolism in marasmic children. Foreign Letters-India.—p. 911.

Vol. 174, October 22, 1960

The role of effort and occupation (including physicians) in coronary occlusion. A. M. Master.—p. 942.

Vol. 174, October 29, 1960

*Quality and safety in frozen foods. Council on Foods and Nutrition. H. K. Burr and R. P. Elliott.—p. 1178.

*Paraffin paper milk cartons. Questions and Answers.—p. 1220.

Vol. 174, November 5, 1960

*Bagassosis. Peculiarities of its geographical pattern and report of the first case from Peru and Puerto Rico. H. A. Buechner.—p. 1237.

*Antibiotics as food preservatives. Council on Foods and Nutrition. R. H. Vaughn and G. F. Stewart.—p. 1308.

*Radiation preservation of foods. Council on Foods and Nutrition. H. E. Robinson and W. M. Urbain.—p. 1310.

*Kwashiorkor. Foreign Letters-India.—p. 1343.

*Cardiovascular disease and hardness of water. Correspondence.—p. 1346.

*Zinc metabolism. Questions and Answers.—p. 1354.

*Meat tenderizer. Questions and Answers.—p. 1355.

Infectious Hepatitis. The effect of gamma globulin in preventing infectious hepatitis was studied in four controlled trials in an institution where the disease was highly endemic. In the first trial, a single dose of 0.01 ml. per pound body weight was followed by a two-and-one-half-fold reduction in incidence of hepatitis with jaundice in a group of patients, predominantly children. When the same dose was given simultaneously to adult hospital attendants, it was ineffective. In the second and third trials, inoculation of 0.06 ml. gamma globulin per pound body weight was followed by a tenfold and thirtyfold reduced incidence of overt jaundice. In a fourth trial, a small group of newly admitted patients was studied inten-

sively for subclinical infection. Under the conditions of this trial, clinically inapparent hepatitis occurred in spite of gamma globulin. The ratio of subclinical anicteric hepatitis to overt jaundice was 12:1. On the basis of these studies, it is suggested that the optimal dose of gamma globulin for children and especially adults is 0.06 ml. per pound body weight.

Protein Metabolism in Marasmic Children. Urinary excretion of total nitrogen was studied, and quantitative and qualitative estimations of amino-nitrogen and ammonia nitrogen in the urine of fifteen marasmic children were done. Serum amino acids were also estimated. The marasmic children were grossly underweight. The linear growth was little affected in the age group zero to twelve months, but retardation of linear growth was noticed in the age group thirteen to twenty-four months. An increased loss of total nitrogen in the urine of marasmic children of all age groups and an increase in the excretion levels of amino-nitrogen and ammonia nitrogen were observed. The increased amino-aciduria was due to an increased excretion not of any one amino acid but of several. Quantitative estimation of serum amino acids showed no increase in their concentration in marasmic children. This would indicate that the liver is probably not affected as regards amino acid metabolism. The amino-aciduria may be due to derangement of kidney function with particular reference to amino acid metabolism.

Quality and Safety in Frozen Foods. Modern industrial practices and research have continuously been improving the quality of frozen foods. When handled according to good commercial practice, they are safe, nutritious, and flavorful. Defects from improper or prolonged frozen storage are primarily chemical or physical. Bacterial spoilage occurs only on gross mishandling. Food poisoning organisms do not grow in chilled or frozen foods held at temperatures under 40°F. It is of pertinent interest that *Trichinella spiralis* dies out rapidly in frozen pork. Food law officials and industry associations are taking vigorous action to improve commercial handling of frozen foods.

Paraffin Paper Milk Cartons. The Food and Drug Administration has, since the advent of the new Food Additives Amendment, taken a careful look at the wax used to coat the paper in milk cartons and other containers for food and in all cases have eliminated any varieties that might be questionable. Tests in small animals have shown that some carcinogens in waxes are similar to those used in the preparation of milk cartons, but there is no evidence that the approved coating materials are carcinogenic. The amount of wax which will be found in milk stored in wax-coated containers would, in any case, be infinitesimal, and it is doubtful that any adverse effect would occur.

Bagassosis. Bagassosis is an occupational disease due to the inhalation of dust from dried sugar cane fiber, or bagasse, which has become an important industrial material. The fresh fiber is apparently innocuous, and illness follows contact only with old bagasse which has been baled and allowed to dry. This fact evidently accounts for peculiarities of the distribution of the disorder. The disease has been absent from most of the great cane-growing areas of the world, but has recently appeared at a new paper mill in Puerto Rico where approximately eighty cases have been observed. The first of these cases is described. The patient, a white male, forty-seven years of age, had suffered a prior episode of bagassosis while employed in a similar paper mill in Peru. No treatment of any type was used, other than rest and good nutrition. During a period of one week, chest pain, cough, and sputum production disappeared.

Antibiotics as Food Preservatives. Certain antibiotics, under proper conditions, are desirable and useful additives for extending the market life of some foods. However, there are problems and limitations in their use. Antibiotics are not "ideal" preservatives, and even the most successful, the tetracyclines, have limitations. Although they are effective against bacteria, they do not guard against yeasts or molds. And, they can control only some food-spoilage bacteria. Clearly, the proper antibiotic or combination of antibiotics must be determined for each intended use. Another problem involves the concept that the use of antibiotics in man and emergence of resistance to them are correlated. Limiting certain antibiotics to use only for food preservation and not for therapeutic uses in man or for growth-stimulation purposes in animals might help to prevent the development of antibiotic-resistant organisms which cause human disorders. The commercial use of chlortetracycline and oxytetracycline is permitted in poultry in the U.S. and in fish and poultry in Canada.

Radiation Preservation of Foods. Radiation preservation is still in the research stage. A large step forward would be made if ways could be found to use sterilizing levels of radiation without adversely affecting food flavor. Radiation can induce an "off-flavor" resembling a scorched taste. It can also turn cooked meats pink, wilt lettuce, thin the white of eggs, and impair the baking properties of flour. When small quantities of radiation are required, as in inhibiting the sprouting of vegetables such as potatoes and onions and killing insect eggs on fruits, vegetables, and grain, flavor alterations and other sensory changes do not constitute problems. Observed changes in nutritive value resemble those which occur with other preservation methods and are not considered serious. Great effort has been expended in developing useful and economic sources of radiation. Gamma rays or electron beams are used to destroy the spoilage micro-organisms in food. Cobalt^{60} is a good possibility technically, but is too expensive. Fission products, such as cesium^{137}, might be available in the future at sufficiently low cost as a by-product of atomic reactor operations. Electron generators are most economical at present, but since electrons cannot penetrate as far as gamma rays, their use may be limited. Another problem created by radiation involves safety. No irradiation process could be used until the Food and Drug Administration and possibly other governmental agencies approve it. Such approval is not likely until present research involving animal-feeding studies has been completed.

Kwashiorkor. The effects and comparative value of a vegetable protein (pulse) diet alone and a similar diet fortified with a preparation containing 90 per cent milk-protein were studied in kwashiorkor patients. The milk protein formed 20 per cent of the total protein. Diarrhea and edema cleared up with almost the same rapidity in the two groups, within two weeks after starting treatment. Scaling and erythema disappeared rapidly with both diets, but pigmentation took longer to disappear. The total plasma proteins increased in both groups, the rise being greater in the pulse group. The average increase in serum albumin was higher in the milk-protein group, while the globulin content was raised more in the pulse group. The alpha-1 globulin level was reduced and the alpha-2 globulin level raised in the vegetable-protein group. Those on milk-protein showed an increase in all globulin fractions except the alpha-2 which was reduced. The gamma globulin showed a greater drop in those on vegetable proteins only. The blood urea values were low and rose with treatment. The average rise was twice as great in patients receiving milk protein, indicating higher nitrogen retention. The authors conclude that the higher rise in serum albumin with milk-protein supplement is probably due to the higher amino acid content, while the sharper decrease in gamma globulin with the pulse diet alone would indicate a more satisfactory improvement in liver function. Clinical improvement and recession in the liver biopsy picture were comparable in both groups.

Cardiovascular Disease and Water Hardness. In a letter to the editor, a physician comments on an earlier article in which the theory is advanced that geographical areas with soft water produce a higher mortality rate for cardiovascular disease than those with hard water. He raises the question whether it is the softness of the water, or rather the heavy population density found in these same areas that is responsible. The author of this article also has written a letter defending his position. He states that

the physician contesting his article points out a defect inherent in the correlation coefficient which relates two progressively changing variables, but does not indicate magnitude of change. The author of the article does not believe that there is a clear-cut trend to indicate that the stress and strain in heavy population areas is a factor in raising the death rate of this disease. He does imply that there appears to be an influence on the death rate and that this influence is somehow linked to water, or to some factor to which water is related. As a first approach to solution of the problem, although an etiologic factor might well not be found, he suggests that a study of water might be rewarding, for water is one localized "dietary" variable to which all persons are exposed. Also, water lends itself to exact measurements, while stress and strain do not.

Zinc Metabolism. Zinc metabolism is affected by alcoholism at least when associated with Laennec's cirrhosis. Large quantities of zinc are excreted in the urine and low zinc levels in other organs have been demonstrated in such patients. Values have been found of 12.5 mg. zinc per 100 gm. dry tissue in livers containing less iron than normal and 17.9 mg. per 100 gm. in those with normal to excess iron content. These quantities compare with that of 27.6 mg. in normal livers. Comparable values for copper were 7.7 and 6.7 mg. (normal, 4.53). There was little alteration in the copper content of other tissues. It can be assumed that zinc and copper metabolism are not interchangeable in alcoholism associated with cirrhosis.

Meat Tenderizer. A solution of the enzyme papain, obtained from the papaya plant, is most commonly used commercially for tenderizing meat. The enzyme softens the connective tissue as well as the muscle protein. Cooking inactivates the enzyme, and no harmful effects have been reported from use in such a manner.

JOURNAL OF THE CANADIAN DIETETIC ASSOCIATION

Vol. 22, September, 1960

*Nutritive value of fresh milk and two "instant" nonfat milk powders. Part II. Rat growth assay. M. Blais and R. Beaudoin.—p. 160.

*New trends in food service equipment. L. A. K. Frolich.—p. 179.

*Nutritional and other aspects of ageing. P. G. Weil.—p. 185.

Nutritive Value of Milk. The study reported here compares the nutritive value of fresh pasteurized milk and two brands of "instant" nonfat dry milk powders, using forty-six male albino rats in a growth study. Procedures and results are described. The "instant" nonfat dry milks were enriched with butterfat and reconstituted with distilled water so as to have the same fat and total solid nonfat composition as fresh milk. Better growth response was obtained in the animals fed fresh milk. This might be attributed to the fact that the fresh milk contained more of the B-complex vitamins (other than thiamine and riboflavin) than did the reconstituted instant milks.

Trends in Equipment. Demands of present-day operation have resulted in re-evaluation and redesign of food service equipment. One example of this is the trend toward container continuity (or one pan operation). Most frequently used is the 12 by 20 in. hotel pan (and its component parts) and the 18 by 26 in. baker's pan. Steamers, ovens, reach-in refrigerators, and food conveyors are adaptable to these pans. Innovations in ovens, steamers, and steam-jacketed kettles are described, and safety and timing devices are brought to attention. Mobility of equipment is noted also; ranges and deck ovens, deep-fat fryers, refrigerator trays, and food carts are among the items that have been made mobile.

Aspects of Aging. Considerable discussion is given to various definitions of the term, "aging," and to related terms — "geriatrics," "gerontology," "senescence," and "senility." Nutritional aspects of aging are enumerated, too. Among them are: overweight, arteriosclerosis, and alcoholic cirrhosis of the liver. Application of the science of nutrition has lagged in two areas: nuclear testing and its effects in polluting our food supply with radioactive fallout, and the problem of feeding those in underdeveloped countries now living in semi-starvation.

THE JOURNAL OF CLINICAL INVESTIGATION

Vol. 39, August, 1960

*Effects of human growth hormone on levels of blood and urinary carbohydrate and fat metabolites in man. D. H. Henneman and P. H. Henneman.—p. 1239.

Vol. 39, September, 1960

*Gas chromatographic analysis of the fatty acid composition of the plasma lipids in normal and diabetic subjects. B. Hallgren, S. Stenhagen, A. Svanborg, and L. Svennerholm—p. 1424.

Effects of Human Growth Hormone. Administration of human growth hormone to five patients with hypopituitarism, one with hyperinsulinism, and one with obesity produced alterations in blood levels of carbohydrate and fat metabolites which preceded marked detectable changes in protein metabolism by approximately 24 hr. There was a prompt rise in plasma free fatty acids and blood and urinary citrate and ketones. Continued daily doses of human growth hormone produced marked nitrogen retention, glucose intolerance, a sustained rise in plasma free fatty acids and serum and urinary citrate, elevations in blood pyruvate, and a decrease in blood lactate. Administration of human growth hormone for more than two to three weeks resulted in gradual return of nitrogen excretion and blood and urinary metabolites toward control levels but continued glucose intolerance.

Plasma Fatty Acids in Normals and Diabetics. The fatty acid composition of cholesterol esters, triglycerides, and phospholipids was studied by gas chromatographic analysis in seven patients with diabetes with vascular complications and in seven healthy individuals of the same age on a similar diet. The fatty acid composition of the different plasma lipids was remarkably similar in the two groups. The only pathologic finding demonstrable in the diabetic patients was an abnormally high lipid level in some cases. During chromatography on silicic acid, the more saturated cholesterol esters and triglycerides moved faster than the more unsaturated ones. The accuracy of the conventionally used factor of 25 for calculating phospholipids from phosphorus determinations was substantiated. In the control subjects, the mean molecular weights of the cholesterol ester fatty acids and triglyceride fatty acids were 276 and 272, respectively. In an additional study of the plasma liquids of a healthy vegetarian consuming 40 to 60 gm. of corn oil daily, the most marked decrease of linoleic acid was found in the triglycerides along with a small increase in the cholesterol esters. The phospholipids had the most constant fatty acid pattern.

JOURNAL OF THE DIETETIC ASSOCIATION VICTORIA

Vol. 11, September, 1960

*Gluten free bread for coeliacs. F. Townsend and A. Rowe.—p. 7

Gluten-Free Bread for Celiacs. Wheat protein is unique among cereal proteins in that after hydration, it forms a gluten network capable of holding gas, and during baking, it sets to a semi-rigid structure which prevents the loaf from collapsing. Experiments have shown that a reasonably good loaf of gluten-free bread can be produced by using a specially prepared liquid starch gel in combination with milk, corn flour, salt, and the conventional leavening agent, yeast. Two recipes are presented, one for commercial use and the other for the average homemaker.

THE JOURNAL OF LABORATORY AND CLINICAL MEDICINE

Vol. 56, October, 1960

*Distribution of radioactivity in man after the oral ingestion of small test doses of radiolabeled cyanocobalamin. A. Doscherholmen, P. R. Finley, and P. S. Hagen.—p. 547.

Distribution and Absorption of Labeled B_{12}. A study was made to determine the distribution and absorption of orally ingested radioactive cyanocobalamin in the presence of the intrinsic factor. Test doses were given to eleven seriously ill patients who died from 3 hr. to 113 days later. To determine the distribution and storage sites, radioactivity of the various organs was measured after death. The most rapid transfer of the vitamin to other organs took place between 7 and 24 hr. after ingestion. In the majority

of patients, the ileum was the most important site for temporary storage of radioactivity and, therefore, probably for the storage of B_{12}. The liver, kidney, and spleen had the same concentration during the first two days, but later concentration increased in the liver and decreased in the other two organs. Absorption of the vitamin was impaired shortly before death, even in the presence of adequate amounts of the intrinsic factor.

THE JOURNAL OF NUTRITION

Vol. 72, October, 1960

*The nutritional value of fats after use in commercial deep-fat frying. C. E. Poling, W. D. Warner, P.E. Mone, and E. E. Rice. —p. 109.

*The cariostatic effect in white rats of phosphorous and calcium supplements added to the flour of bread formulas and to bread diets. F. J. McClure.—p. 131.

*A statistical study of apparent digestibility coefficients of the energy-yielding components of a nutritionally adequate mixed diet consumed by 103 young human adults. E. W. Crampton, F. A. Farmer, H. B. McKirdy, L. E. Lloyd, E. Donefer, and D. J. Schad.—p. 177.

*Manganese metabolism in college women. B. B. North, J. M. Leichsenring, and L. M. Norris.—p. 217.

*The influence of dietary factors upon the composition of mineralized tissues and upon the susceptibility of enamel to erosion *in vivo*. I. Phosphorous. L. N. Ellis and E. J. Dwyer.—p. 224.

*The influence of sleep, work, diuresis, heat, acute starvation, thiamine intake and bed rest on human riboflavin excretion. R. G. Tucker, O. Mickelsen, and A. Keys.—p. 251.

Vol. 72, November, 1960

*Metabolic patterns in preadolescent children. III. Sulfur balance on three levels of nitrogen intake. J. B. Wright, P. G. Martin, M. L. Skellenger, and D. S. Moschette.—p. 314.

*The effect of animal protein and vegetable protein diets having the same fat content on the serum lipid levels of young women. G. R. Walker, E. H. Morse, and V. O. Overley.—p. 317.

*Effects of pantothenic acid, pyridoxine and thiamine deficiencies upon antibody formation to influenza virus PR-8 in rates. A. E. Axelrod and S. Hopper.—p. 325.

Nutritive Value of Commercially Used Fats. A short term (seven-day) feeding procedure was developed to detect changes induced in fats by heating. This involved measurements of biologically-available energy of the fats fed and weight of the livers of rats. Unsaturated fats which had been damaged by long heating at high temperatures or under oxidative conditions reduced energy values and tended to cause substantial increases in liver weights. The majority of thirty-four samples of commercially-used fats obtained from bakeries, restaurants, or manufacturers of potato chips or doughnuts showed no impairment of nutritional value, in marked contrast with findings for laboratory-heated fats. Only slight, possibility not significant, increases were observed in liver weights when testing commercially-used fats, again in sharp contrast to the marked statistically significant increases observed for laboratory-heated fats.

Phosphated Bread and Dental Caries. A relatively simple diet composed of dry bread, glucose, and essential vitamins resulted in extensive dental caries in rats. Bread prepared with a flour containing 1 per cent of sodium phosphate reduced caries incidence an average of 51 per cent; the severity score was reduced an average of 83 per cent. Use of bread flour containing 1 per cent ammonium phosphate was responsible for a 72 per cent reduction in caries incidence and 93 per cent reduction in severity score. These phosphates also significantly inhibited caries when added directly to bread diets. Calcium monophosphate at a 1.75 per cent level in the bread flour and 1.5 per cent tribasic calcium phosphate in the bread-glucose diet significantly inhibited dental caries. Sodium phytate at 1.41 per cent reduced caries incidence an average 77 per cent and severity score an average 91 per cent. Calcium lactate added to bread flour was anticariogenic, but calcium gluconate had no anticaries effect. These results add substantially to previous evidence of a significant cariostatic effect of a phosphated bread and a phosphate supplement added to a bread-glucose cariogenic diet.

Diet Digestibility. A study of the digestibility of a diet in the form of muffins and/or biscuits made from a selection of ingredients that together furnished nutrients meeting the Canadian Dietary Standard requirements was carried out over a three-year period. A statistical study using methods of covariance and partial regression was made of voluntary food intake, and of the coefficients of apparent digestibility of dry matter, energy (calories), crude protein, ether extract, and carbohydrate by difference. The range of voluntary caloric intake varied from as low as 25 to as high as 175 per cent of the computed daily maintenance needs. However, neither sex, weight of subject, nor dietary intake, relative to computed maintenance requirement, significantly affected the coefficients of apparent digestibility for any of the above five dietary components. Weight of subject and level of dietary intake together accounted for only about 7 per cent of the variability in the digestibility coefficients, and of this insignificant total, the relative beta values indicated that 90 per cent was traceable to the varying amounts eaten. It was shown that digestible energy, determined by bomb calorimeter combustion of foods and of feces, could be converted directly to metabolizable energy by deducting from the digestible calories per 100 gm. of diet, 1 calorie for each percentage unit of crude protein in the dry matter of the diet.

Manganese Metabolism in Women. Manganese metabolism was studied in nine healthy college women ranging in age from eighteen to twenty-one years. The basal diet provided a mean daily intake of 3.16 mg. manganese. The manganese intake for the nine subjects (basal diet plus *ad libitum* foods) was 3.70 mg. per day. Analyses of the urine and fecal specimens gave a mean daily manganese excretion for all subjects of 2.17 mg., of which 91 per cent was in the feces. The mean daily retention was 1.54 mg., or 41 per cent of intake. Manganese intakes and retentions also were computed for the subjects on the basis of body weight. The mean daily intake was 0.068 mg. per kilogram and the mean retention, 0.028 mg. per kilogram. For these subjects, manganese retention was significantly related to intake. The regression coefficient also was computed. A linear relationship between intake and retention was observed. It is possible that intake levels higher than those used in this study would have results in greater retentions.

Phosphorus and Erosion of Tooth Enamel. During the last ten years, evidence has been accumulating that the mineral composition of the diet plays an important role in the formation of mineralized tissues and in the susceptibility of enamel to erosion and to formation of caries. The studies reported here were conducted to determine the interrelationship between certain dietary constituents and the resistance of enamel *in vivo* to the erosive action of commonly consumed acidic fluids. In these studies the ratio of calcium to phosphorus in the diet, rather than the level of phosphorus, seemed to be the factor determining the extent to which erosion occurred when teeth were exposed to acidic fluids, such as cola and orange juice. With two ratios of calcium to phosphorus and two types of diet, the erosion was more severe when the calcium to phosphorus decreased.

Urinary Excretion of Riboflavin in Man. Urinary excretion of riboflavin was studied in normal men under a variety of environmental conditions. Diurnally, meals tended to increase and sleep to retard the rate of excretion. Short periods of hard physical work were accompanied by a decreased excretion of riboflavin which appeared to be related to decreased renal plasma flow. Diuresis, induced with water, was without effect on the excretion of riboflavin. Acute starvation increased the riboflavin excretion approximately threefold when men performed hard physical work for three days and approximately fivefold when starved for seven days under sedentary conditions. Heat stress (49°C. and 30 per cent relative humidity 10 hr. per day for six days) increased the mean riboflavin excretion gradually from 443 mcg. per day initially to a maximum of 692 mcg. Enforced bed rest increased the mean excretion by 487 mcg. per day in spite of a concomitant reduction in riboflavin intake of 0.31 mg. per day. Thiamine deficiency alone led to an immediate increase in riboflavin excretion. In combined thiamine and riboflavin deficiency, the increased

excretion of riboflavin was observed only after four weeks of deprivation. In both cases, increased riboflavin excretion was restored to normal when the subjects were given 5 mg. thiamine per day.

Sulphur Balances in Preadolescents. Sulphur balance studies were carried out on preadolescent girls with daily nitrogen intakes of 2.89, 3.52, and 11.15 gm. Average nitrogen:sulphur intake ratios were: 12.5, 13.2, and 14.6. Average urinary nitrogen:sulphur ratios were 13.8, 13.5, and 25.4; average fecal ratios were 10.1, 10.2, and 12.7, and for retention, 12.6, 13.7, and 5.1 for the three levels of intake in ascending order. Approximately one-eighth of the total sulphur intake was retained on low-nitrogen intake and about half of the total sulphur intake when nitrogen intake was as high as 11 gm. daily. Highly significant differences existed between levels of nitrogen fed in both urinary excretion of sulphur and sulphur retained, but not in fecal sulphur excretion. A highly significant correlation existed between sulphur and nitrogen excreted in both the urine and the feces, and between the sulphur and nitrogen retained when the nitrogen ingested was low; when nitrogen intake was high, correlations were not significant.

Dietary Protein and Serum Lipid Levels. The difference in effect on serum lipids of two protein diets, one deriving its protein from vegetable sources and one from animal source, was observed. The diets each contained 50 gm. protein; the mixed fat content of the two diets was the same in amount (95 gm.) and origin. At the end of two weeks and five weeks on the regimen, serum cholesterol levels of the subjects receiving the vegetable-protein diet were significantly lower than those eating the animal-protein diet. They were also lower at the third, fourth, and sixth weeks, but the differences were not significant. Serum lipid phosphorus levels of the vegetable-protein group were lower than those of the animal-protein group at the end of two weeks, but there were no differences during the remaining four weeks. There was no difference between the serum fatty ester levels of the two groups during the six weeks. Serum cholesterol significantly decreased in both groups during the six weeks. Also a small decrease was observed in the serum lipid phosphorus levels of the vegetable-protein group, but no change in the serum liquid phosphorus levels of the animal-protein group or in the serum fatty ester levels of either group during the study.

Antibody Formation in Vitamin Deficiencies. The effects of pantothenic acid, pyridoxine, and thiamine deficiencies on antibody production to influenza virus PR-8 were investigated. Deficient rats were immunized with allantoic fluid infected with influenza virus, and resulting levels of serum antibody were determined with a hemagglutination-inhibition procedure. *Ad libitum*-fed and inanition controls were used. High levels of serum antibody were attained in both types of controls. In contrast, antibody production was markedly impaired in pantothenic acid- and pyridoxine-deficient rats. A pronounced thiamine deficiency failed to affect antibody production.

THE JOURNAL OF PEDIATRICS

Vol. 57, October, 1960

*A syndrome of phenylketonuria with normal intelligence and behavior disturbances. B. S. Sutherland, H. K. Berry, and H. C. Shirkey.—p. 521.

*Leucine-induced hypoglycemia. II. Studies concerning other amino acids and leucine metabolites. C. C. Mabry, A. M. DiGeorge, and V. H. Auerbach.—p. 539.

*Serum vitamin B_{12} concentrations in kwashiorkor and marasmus. L. G. Macdougall and G. I. M. Ross.—p. 589.

*The serum proteins in kwashiorkor. J. C. Edozien.—p. 594.

*The feeding of prematurely born infants—a critique of current staus. M. Davidson. —p. 604.

Diagnosing Phenylketonuria. Two patients with biochemical characteristics of phenylketonuria are described, one with normal and the other with nearly normal mental ability. On preliminary examination, a previously unreviewed psychologic and psychomotor symptom complex common to both patients was recognized, which made diagnosis possible despite normal mental capacity. A phenylalanine-restricted diet used in treating one patient brought about alleviation of psychomotor and psychologic agitation, suggesting that dietary therapy in the older phenylketonuric child may be beneficial. There appeared to be a definite relationship between IQ and serum phenylalanine concentration in these two children. The diagnosis of phenylketonuria in a child with normal mental ability may lead to recognition of families in which the abnormal gene is present.

Leucine-Induced Hypoglycemia. The mechanism by which leucine may alter carbohydrate metabolism in certain individuals to such a profound degree as to produce severe hypoglycemia is at present unknown. Two infants with leucine-sensitive hypoglycemia are described. A standard intravenous leucine-tolerance test has been devised and used in studying these infants and euglycemic and other hypoglycemic children who were not leucine-sensitive. The leucine-sensitive children consistently had a decline in blood sugar levels of more than 50 per cent 20 to 40 min. after administration of the leucine. The diagnosis of leucine-sensitive hypoglycemia and management of infants who have it are discussed.

Serum Vitamin B_{12} in Kwashiorkor. Serum B_{12} estimations were made on the sera of eight children with kwashiorkor and five with marasmus. Average B_{12} concentration in the kwashiorkor children was 676 $\mu\mu$g. per milliliter, and in marasmic children 341 $\mu\mu$g. No patient in either group was deficient in vitamin B_{12}. Two of the most severely ill kwashiorkor children had concentrations of over 1000 $\mu\mu$g. per milliliter. During recovery, serum B_{12} concentrations fell in the kwashiorkor patients and rose in the marasmic. The possible significance of this finding is discussed.

Serum Proteins in Kwashiorkor. Total serum proteins and protein fractions have been estimated in healthy Nigerian children, in children with kwashiorkor, and in patients who have recovered from kwashiorkor. In kwashiorkor, there was a statistically significant fall in the mean absolute concentration of total proteins, albumin, alpha-2 globulin, and beta globulin. Mean alpha-1 globulin concentration was also less than normal, but the difference is not significant in all age periods. The changes in mean gamma globulin concentration were not statistically significant. Albumin showed a marked fall, alpha-1 and alpha-2 globulins a variable change, and beta globulin a slight fall, while gamma globulin showed a marked rise in relative concentration. It is concluded that the serum protein pattern in kwashiorkor is produced by a combination of quantitative and qualitative deficiency of amino acids, liver damage, and infection. Furthermore, the globulin fractions of the serum proteins may include proteins that are physiologically less labile than the serum albumin. The changes in serum protein play an important part in the production of edema; they also account for the reduction in serum iron-binding capacity, copper, and calcium.

Feeding Premature Infants. No dietary plan for premature infants is presently in an unquestioned position. There are many unanswered questions. More effort must be expended to define the goals and the meaning of terms, such as "adequate" and "optimal," and on the design of experiments to test these concepts than on trying to win additional support for work previously carried out in relation to high- or low-protein regimens in the feeding of premature infants.

MEDICINE

Vol. 39, September, 1960

*Salmonella arthritis. J. R. David and R. L. Black.—p. 385.

Salmonella Arthritis. The authors reported on eighty-four cases of salmonella arthritis which is a rare complication occurring in 0.27 per cent of salmonella infections. In *S. choleraesusis* infection, however, arthritis occurs in 2.4 per cent. The source of infection could be determined in only a few cases; one such causative organism was isolated from a smoked sausage. The majority of cases (55 per cent) occurred in children below age six. Arthritis was commonly the first manifestation of the disease; knees and shoulders were the most frequently involved joints. There appeared to be two types of courses for this disease; an acute or chronic arthritis lasting less than three months

and a chronic recurrent course of more than one year's duration. The lack of well controlled cases makes it difficult to determine whether antibiotic therapy significantly influences the course of salmonella arthritis.

METABOLISM

Vol. 9, September, 1960

*Effect of safflower and coconut oils upon plasma cholesterol and lipid fractions. R. Okey, M. Lee, M. C. Hampton, and P. Milkanich.—p. 791.

Vol. 9, October, 1960

*Experimental reconstruction of metabolic pattern of lipid nephrosis: key role of hepatic protein synthesis in hyperlipemia. J. B. Marsh and D. L. Drabkin.—p. 946.

Fats and Serum Cholesterol. Safflower oil and coconut oil were alternately substituted for some 80 per cent of the fat in an ordinary good diet. Safflower oil increased the linoleic acid content of plasma cholesterol esters while the percentages of total and free plasma cholesterol decreased. However, the increase in the linoleate content of cholesterol esters was far less than that in plasma glycerides. The linoleate content of plasma glycerides returned promptly to control level when the subjects resumed eating the control ration, whereas the increased linoleate content of cholesterol esters persisted for at least a month, as did the lowered plasma cholesterol. Feeding coconut oil produced comparatively small increases in saturated fatty acids and decreases in linoleic acid. A possible explanation of this relatively minor change as compared with that with safflower oil is the smaller differences between the properties of the fats in the control ration and in the coconut oil. The data suggest that a diet high in linoleate many build up a tissue reserve of linoleate that is reflected in the linoleate content of plasma cholesterol esters over a considerable period of time.

Hyperlipemia in Nephrosis. Experimental nephrosis, a close counterpart of the human disease, was produced in the rat. It was employed to investigate the metabolic consequences of the urinary loss of plasma proteins. The lipidemia which occurs is more readily understood as a part of the metabolic adjustment to the central feature of the disease, the wasteful loss of body protein, by a comparison with diabetes mellitus, in which the unavailability of glucose for metabolic needs and its loss in urine stimulates the body to produce more sugar. So, in nephrosis, the loss of plasma protein stimulates the liver to produce more plasma proteins. The liver, also, increases the synthesis of plasma lipoproteins. The free fatty acids originate from the adipose tissue depots, the plasma proteins with their neutral fats, lecithins, cholesterol, and cholesterol esters, being contributed by the liver itself. Plasma lipoproteins are not lost in the urine although body tissue protein is. The result is hyperlipemia.

NATURE

No. 4744, October 1, 1960

*Influence of pteridines on the production of vitamin B_{12} by trypanosomid flagellates. H. A. Nathan, H. Baker, and O. Frank.—p. 35.

Production of Vitamin B_{12}. Vitamin B_{12} was used to study the function of the Crithidia factor because it is known that in certain diseases involving vitamin B_{12}, folic acid sometimes relieves symptoms, whereas in other B_{12}-linked diseases, such as pernicious anemia, folic acid potentiates neurologic involvement. To check the validity of measuring the vitamin B_{12} formed by *C. fasciculata*, the products formed by *S. oncopetti*, a related protozoan which requires para-aminobenzoic acid but not pteridine, were also assayed. The findings bring out that relatively large quantities of B_{12} compounds produced by *S. oncopetti* can be used for the concentration and identification of the various forms of the vitamin produced and for identification of *C. fasciculata* products. The high yields and absence of the need for exogenous heme also point to the use of *S. oncopetti* for enzymatic studies of B_{12} synthesis.

NEW ENGLAND JOURNAL OF MEDICINE

Vol. 263, October 13, 1960

*Salmonellosis spread by a dietary supplement of avian source. F. R. Philbrook, R. A. MacCready, H. V. Roekel, E. S. Anderson, C. F. Smyser, Jr., F. J. Sanen, and W. M. Groton.—p. 713.

Salmonellia Spread by a Dietary Supplement. An outbreak of 104 cases of salmonellosis among 1850 patients in a mental hospital in which the etiologic agent was *Salmonella typhimurium* is described. Strong epidemiologic evidence is presented that eggnog was the vehicle. Two previously unsolved outbreaks in this institution and in another mental hospital had the common factor of use of eggnog prepared from eggs of one flock of the institution under study. Five thousand and fifty hens of the suspect flock were banded and bled. Ninety-four positive reactors were detected. It is recommended that only pasteurized eggnog be used.

NEW YORK STATE JOURNAL OF MEDICINE

Vol. 60, October 1, 1960

Carbohydrate metabolism—metabolic interrelations and control. P. A. Marks and A. D. Freedman.—p. 3105.

*Overemphasis in nutrition. R. H. Barnes.—p. 3126.

Overemphasis in Nutrition. Most of us, through one medium or another, are being subjected to a barrage of confusing and conflicting reports concerning the nutritional properties of foods. Overemphasis during the vitamin era may have diverted the medical schools and physicians away from learning the fundamentals of nutritional science. Whatever the explanation may be, only a handful of medical schools now teach an appreciable amount of nutrition. Physicians frequently must rely completely on the advice of dietitians or consulting nutritionists. They may not be able even to evaluate the adequacy or soundness of this advice. Patients with specific questions regarding their diet are sometimes parried with generalities or perhaps told to read up on the subject in a nutrition book. Although few conditions treated by the physician will respond to dietary treatment alone, a knowledge of modern nutritional science and dietetics is an important, even an essential, part of his armamentarium. To achieve a proper balance in medical education, we should strive to provide some sound training in nutrition and practical dietetics in the medical curriculum.

THE NEW ZEALAND MEDICAL JOURNAL

Vol. 59, June, 1960

*Nicotinic acid therapy in patients with coronary disease. J. D. Hunter.—p. 280.

Niacin Therapy. In this paper, the author presents his experience using niacin in patients with coronary disease, particularly with regard to observations on the symptomatic changes as well as on the blood cholesterol lowering effects. Nicotinic acid in doses of 3 gm. daily achieved a significant and sustained, although variable, lowering of the blood cholesterol level in twenty-five patients treated for between three and eighteen months. A striking subjective improvement in angina of effort was noted in most patients. Reduction in size of xanthoma tendinosum deposits occurred in one patient. In seven patients, therapy had to be discontinued within a few weeks because of side effects. Flushes and pruritus were generally transient and not serious, but gastrointestinal disturbances precipitated the discontinuation of the drug in six of these patients. Two patients have been maintained on a buffered solution of the acid.

NURSING OUTLOOK

Vol. 8, October, 1960

*How to develop a questionnaire. H. Flitter.—p. 566.

Developing a Questionnaire. From the point of view of research, the purpose of a questionnaire is not the mere collection of data, but a means to solving a problem. The first step in preparing a questionnaire is to think through and formulate the problem, its scope and its limitations, until it is so well understood that it can be communicated to others. After the problem has been delineated and assumptions have been accepted, it is useful to analyze the problem into specific sub-problems (a framework for formulating the items or questions). It is also necessary to decide who the respondents will be and the size of the sample, the general format of the questionnaire, method for pretesting it and processing of the data, the nature of the final report, and

approximate cost. A sample outline or blueprint for a questionnaire is included. The aspects of item-writing or question-construction include vocabulary, structure of the questions, format for answers, and means for insuring comparability of the data. Each of these aspects is discussed. Sample items as illustrations of construction are included.

NUTRITION

Vol. 14, Autumn, 1960

*Dietetic treatment of patients with anorexia nervosa. G. F. M. Russell.—p. 115.

*Use of sea water for cooking dehydrated food. J. M. Harries, M. M. Jamieson, and J. Robertson.—p. 119.

Anorexia Nervosa. Anorexia nervosa is a syndrome characterized by a disturbance of food intake, wasting, and amenorrhea. It occurs most frequently in adolescence and almost exclusively in women. Characteristics of this psychologic disorder are described. The aim of dietetic treatment is to restore body nutrition and inculcate healthier feeding habits. This involves establishing a disciplinary regimen to insure that the patient does not evade attempts to make her eat. A liquid diet, used in the early stages of rehabilitation, is given. Advantages of the liquid diet are that it does not allay hunger readily, so that the patient is able to tolerate a higher caloric intake; moreover, she is unlikely to harbor the same feelings of guilt or fear about liquid food because such morbid ideas embrace predominantly foods which she considers to be fattening or luxurious. Physical rehabilitation is not always accompanied by an improvement in mental state.

Cooking Dehydrated Foods. The majority of dehydrated foods require water for reconstitution. Sometimes supplies of fresh drinking water might be limited. A series of experiments was carried out to determine whether admixtures of fresh and sea water could be used for reconstitution and cooking and to estimate the effect of such admixtures on palatability. Procedures and results are given. Twelve items were tested: stewed beef, pork chops, pre-cooked lamb slices, veal and ham mince, cod steaks, fish cake mix, potato strips, mashed potato powder, green peas, cabbage, carrot strips, and carrot flakes. Of these items, only precooked lamb slices may be cooked in 100 per cent sea water without suffering deterioration in palatability. Sea water had no effect on color, except for stewed beef, and little effect on tenderness, except for potato strips. With the exception of cabbage and potato strips, all other items listed could be reconstituted and cooked in liquid containing no more than 33 per cent sea water.

NUTRITION REVIEWS

Vol. 18, October, 1960

*The physiological basis of thirst. J. L. Falk. —p. 289.

*Food consumption in a hot desert environment.—p. 291.

Physiologic Basis of Thirst. Various theories as to the physiologic basis of thirst are reviewed. These theories include those of internal environment, hormonal factors, metabolic and regulatory factors, and factors in the central nervous system. In conclusion, the theory suggested by the author is that central areas of the nervous system form a pattern which samples the effective osmotic pressure and perhaps the volume of the blood and integrates this information into the adjustive actions of renal regulation and intake behavior.

Food Consumption in a Hot Environment. Energy requirements and nutritional status of troops performing light activities while living under extremely hot desert conditions were carried out in Yuma, Arizona. Two groups of Army personnel were used, one comprising the military police and the other the remaining enlisted personnel at headquarters who carried out light clerical activities. The mean daily temperature averaged 93°, 95°, and 97°F. with the maximum temperatures being 111°, 109°, and 109°F. for the same periods. Relative humidity averaged 21 to 28 per cent. The high food consumption of these groups was in the same range as that of military personnel performing hard physical work at both a temperature environment (4265 calories per day) and in a subarctic environment (4163 calories per day). This study indicates no decrease in the required food intake of men caused by solar radiation and high environmental temperature.

PEDIATRICS

Vol. 26, October, 1960

*The vitamin B_6 content of infant foods. N. A. Hurley, and R. A. Stewart.—p. 679.

Vitamin B_6 in Baby Foods. A nutritional study was made on vitamin B_6 content of infant foods, milk, and milk substitutes. The results indicated that meat foods were the best sources of this vitamin. Milk in sufficient amount was high. Vegetables were found to be high, but, fruits, except for bananas, were poor sources. Cereals were also found to be poor, but with the addition of dry cereal and milk, the vitamin B_6 content was increased. Barley was the best source of B_6 among the cereals.

PROCEEDINGS OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

Vol. 104, August-September, 1960

*Effect of raw soybean meal and amino acids on pancreatic hypertrophy in rats A. N. Booth, D. J. Robbins, W. E. Ribelin, and F. DeEds.—p. 681.

Pancreatic Effects of Raw Soybean Meal Diet. The study was conducted to determine if a soybean meal diet supplemented with amino acids has an effect on the hypertrophy of the pancreas usually observed in chickens and rats on a raw soybean meal diet. Four groups of rats were fed; (a) control (casein) diet; (b) raw soybean meal; (c) raw soybean meal plus four amino acids; and (d) heated soybean meal. All diets contained 14 per cent protein. Weekly records of body weights and food intakes were maintained. After death, pancreatic tissue was examined and weighed. By dividing grams gain in body weight by grams of food consumed, the food efficiency was calculated. The adverse effects of giving raw soybean meal as the only source of dietary protein were: (a) poor growth, (b) reduced food efficiency, and (c) pancreatic hypertrophy. Supplementation with the four amino acids confirmed the earlier finding that growth inhibition is reversed. However, hypertrophy of the pancreas was also observed in the rats fed the supplemented diet; therefore it is assumed that poor growth is not the cause of enlargement of the pancreas. These results tend to support the idea that a decreased growth rate and protein efficiency, produced by feeding raw soybean meal, are the result of direct stimulation of the pancreas. This stimulation results in excessive loss of critical amino acids contained in the pancreatic enzymes eliminated in the feces.

PSYCHOSOMATIC MEDICINE

Vol. 22, July-August, 1960

*Personality in relation to cholesterol metabolism. R. B. Sloan, A. Habib, M. B. Eveson, L. Holland, and R. W. Payne.—p. 325.

Personality and Cholesterol Metabolism. After following a fat-free diet for eight days, thirteen medical students showed an abnormally high fasting cholesterol level compared to a similar group whose level was abnormally low. The former group was found to be more extroverted, critical of authority, verbally aggressive, and competitive. They were more hostile but desired to be less hostile and more sociable. There was a greater amount of coronary heart disease in their families. High positive correlations were found between the height of cholesterol and the traits of "hostility," "ambition," "social drive," and "need for social achievement." Conflicts resulted in elevations of unesterfied fatty acids which may give rise to hypercholesteraemia. Such changes may lead to coronary heart disease.

PUBLIC HEALTH REPORTS

Vol. 75, October, 1960

*Salmonella in Alaska. R. B. Williams and M. W. Dodson—p. 913

Salmonella in Alaska. Results obtained in the study of twenty-six serotypes of some 246 Salmonella organisms from various locations throughout Alaska are summarized. *S. typhimurium, S. typhosa, S. montivideo, S. reading, and S. muenchen* occurred most frequently. Geographically, the various Salmonella types were widely scattered. They were isolated from human beings, dogs, fur seal, seal louse, and gulls. The evidence did not suggest that there were foci of infection with the different types.

ROYAL SOCIETY OF HEALTH JOURNAL

Vol. 80, September-October, 1960

*The future of *Brucella* infection in animals and man. Sir W. Dalrymple-Champneys. —p. 366.

The Future of Brucella Infection. Brucella infects not only cattle, but also hares, goats, and sheep in various sections of the world. This primarily animal disease is also transmitted to man by direct contact with the infected animal or by the consumption of infected milk and milk products. Although the control of this infection in cattle has made great progress in recent years in some of the more advanced countries of the world, the incidence of Brucella infection in bulk milk samples is still considerable. In the poorer countries where goat keeping is such an important means of livelihood, the eradication of the disease presents enormous difficulties. Before 1940 it was believed that there was only one Brucella species, namely *Br. abortus*, but now the possibility of natural mutation is being considered. Brucella infection is not yet a disappearing danger.

WHO CHRONICLE

Vol. 14, September, 1960

*Endemic goitre.—p. 337.

Vol. 14, October, 1960

*Milk and malnutrition. G. Herlitz, A. Wallgren, and A. Vergara.—p. 390.

Endemic Goiter. This issue of the *Chronicle* contains several articles taken from a monograph on endemic goiter recently published by WHO as its latest contribution to the study of goiter control. This monograph provides a comprehensive review of the subject covering the history, prevalence, geographic distribution, health significance, and etiology of endemic goiter, the physiology and pathologic anatomy of the thyroid gland, and various aspects of endemic goiter control. WHO's interest in this subject dates back to 1950 when it started investigating endemic goiter and encouraged governments to investigate the problem within their territories. WHO has been instrumental in stimulating research on problems connected with the iodization of salt and has cooperated with UNICEF in providing aid to countries to begin programs of iodine prophylaxis.

Milk and Malnutrition. Malnutrition is the cause of many diseases in human beings, but is particularly harmful to young children, pregnant women, and nursing mothers. It is one of the principal causes of infant mortality, retarded growth, mental apathy and, later in life, reduced working capacity. The program for the distribution of dry skim milk, carried out by UNICEF in collaboration with FAO and WHO, is an example of joint international action to improve nutrition in less developed countries. However, the distribution of dry skim milk must be considered as a temporary expedient only, adopted to meet an urgent need. This being so, the international agencies must provide countries with the necessary assistance and advice to enable them to develop their own resources and thus cover their nutritional requirements without outside aid.

AMERICAN RESTAURANT

Vol. 44, September 1, 1960

*Spotlight on cost controls. T. Greer.—p. 29.

*Do's and don't's for better restaurant service. J. B. O'Meara.—p. 52.

Vol. 44, October 1, 1960

*How to keep cleanliness from being secondary to everything.—p. 25.

*5 points to good dish washing.—p. 36.

*Left-overs . . . should you freeze them?—p. 39.

Vol. 44, October 15, 1960

*Bake up some more restaurant volume. G. L. Wenzel.—p. 38.

*Uniforms can help you do a better job of merchandising.—p. 42.

Vol. 44, November 1, 1960

*Better meat cookery. C. E. Blackburne. —p. 27.

Food Cost Control. Productivity in the food industry has not increased at the same rate as in other industry. This is due largely to the many variables in food production (desires and habits of the customer, perishability of foods, and use of unskilled labor). If the problem of increasing food production while reducing costs is to be solved, we must: (a) utilize labor to best advantage (take all possible short cuts, use proper tools, train employees, analyze jobs, schedule work, and so on); (b) use more pre-processed food (portion-controlled food, frozen food, mixes); (c) utilize labor-saving devices. Management's function is discussed, with emphasis on working conditions and the elimination of fatigue.

Better Restaurant Service. Five photographs with accompanying notations emphasize the following procedures which result in better service: (a) dipping up soup properly; (b) checking both wet and dry garbage at frequent, unscheduled intervals; (c) pointing out to waitresses food checks that are illegible; (d) complimenting employees on work well done; and (e) showing an employee how to do his work.

Kitchen Cleanliness. High standards of sanitation are just as important as good food. The most satisfactory way to care for equipment is to set aside a scheduled time for cleaning and maintenance. A ten-page "manual" is presented which gives job analyses for cleaning equipment in a multiple operation kitchen, as well as the average daily and weekly cleaning times for each item. Analyses are included for ranges, ovens, broilers, deep-fat fryers, griddles (both conditioning and cleaning), steamers, steam-jacketed kettles, trunnion kettles, mixers, food slicing machines, food choppers, and the bain marie. These are followed by directions for cleaning shelves, bins and containers holding supplies, cook's sinks and drains, and kitchen drawers. Cleaning of equipment in the service kitchen comes next, covering the following: steam table, food warmer, coffee urn, roll warmer, toaster, waffle baker, cold table, ice cream cabinets, and fountain sirup pumps. Instructions for kitchen porters relate to: refrigerators; freezers; ice cream cabinets (monthly); potato peeler; French-fry cutter; kitchen ceiling, walls, and doors; light fixtures; fans; kitchen floor; pot washer's rack; pot washing and cleaning sink; and garbage. There are itemized lists for cleaning supplies used in production and those dispensed for dressing and rest rooms. Storage, selection, and care of cleaning equipment is not forgotten. Twenty essential kitchen brushes are sketched.

Good Dish Washing. Supervision of sanitation procedures is a major problem in food service operations. All phases of dishwashing need to be watched carefully: (a) water and its temperature, (b) detergents, (c) functioning of the dish machine, (d) intelligent employees, and (e) adequate supervision. It must be realized, too, that there is no substitute for the new mechanized modern machinery. The new machines offer such advantages as savings on labor costs, speedy replacement of wares during service, glorification of the "scullery job," easier work and better hours, better cleaning job, and improved sanitary conditions. Improvements in detergents, the use of wetting agents, rinse injectors, removing tarnish from silver, iodine sanitizing, improved mechanical developments such as prescrapping systems, coated baskets to reduce breakage, and equipment designed to reduce transporting and storage of tableware are among the highlights mentioned. Directions for cleaning the dishwashing machine and dish tables are listed.

Freezing Leftovers. Often, freezing leftovers is a waste of time—the wrong foods are frozen, they are not packaged correctly, or the freezing itself is not done correctly. Groupings are given, providing a guide to the types of leftovers which can be frozen and used later. First, there is "*the little change group*"; including rolls, cookies, most cakes, winter types of squash, clear soups, and apple sauce. Second is "*the modification-required group.*" These can be refrozen if certain modifications are made, such as thickening sauces, only partial cooking when first prepared, use of only light seasoning, and so on. Examples are creamed soups, poultry pies, most gravies and sauces, creamed chicken and turkey. The third type is "*the short-life group,*" which deteriorate rapidly at ordinary storage temperatures. They include shellfish, hamburger, turkey dishes, and fatty species of fish. Finally, there is the "*no freeze group*" (vegetable salads, custards, and cooked egg whites). Operating the freezer at minus 10°F. is good standard procedure. The "ifs" and "buts" of refreezing thawed foods are weighed, and reactions of different types of foods are described. Foods mentioned are meats, poultry, and

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fish; shellfish; fruits; vegetables; and fruit juices.

Bake Your Bread. Products from a restaurant's own bake ovens create guest satisfaction. Since other employees have full schedules, this extra baking often must fall to the owner. However, the effort is worth it. The recipe and complete instructions are given for making French bread.

Employee Uniforms. Uniforms are a basic factor in the aggressive merchandising programs and management strategies of many organizations. They tend to "organize" the work staff into coherent units. Uniforms individualized by job (one type for counter girls, another for waitresses, and still another for supervisory employees and hostesses) give motivation, and work flow is visualized more easily. They should reflect decor and give a "dress-up" look. It is important to check design features, size scale, and fabrics.

Meat Cookery. To enable food service operators to make the most of their meat dollar, this twenty-page section on meat cookery was prepared. Topics covered are roasts and roasting, steak cookery, round steak recipes, fabricated meats, meat pies (nine varied recipes including lamb curry pie, veal pot pie, beef steak and kidney pie), stews, and many recipes for pork, lamb, veal, and liver.

COLLEGE AND UNIVERSITY BUSINESS

Vol. 29, October, 1960

*Where the foods administrator may fail. A. L. Ellingson.—p. 58.

College Union Food Service. The value of food service in the college union is often given less than full appreciation. "Education" at a number of points can help this situation. The profit made in food service is needed for operation, program, and expansion. These facts should be made known. The importance of student labor should be explained. Furthermore, there needs to be more training of students and faculty alike in the amenities of dining (there's a difference between dining and eating). Bringing the foods staff into wider acquaintance with the entire union program—its purpose and its policies—will result in a stronger campus center program. In addition, food managers must be willing to extend their interests beyond their own area and to understand the role of the college and the union's specific and general obligations as a part of the college.

DRIVE-IN MANAGEMENT

Vol. 19, October, 1960

*Purchasing file for chicken.—p. 31.

Chicken Purchasing. Chicken, a popular and versatile item, is available in many forms. Both regularly processed (raw chicken, chilled and ice packed) and frozen ready-to-cook chicken items come portion-control packed with as little as fractions of an ounce in weight variation. Explanation is given for these terms: broiler or broiler-fryer, bro-hen, capon, fryer, hen, ready-to-cook, roaster, stewing chicken, and chicken fillets. A raw chicken portion guide is included for roast chicken, creamed chicken, fried chicken, and chicken pie. On one page are outlined the uses of chicken products. Twelve recipes give various ways to flavor chicken dishes.

FAST FOOD MAGAZINE

Vol. 59, October, 1960

*Automated service units. H. B. Jones.—p. 58.
*Space age beverage dispensers.—p. 62.
*What's cooking with cook-in-bags?—p. 65.

Push-Button Service Units. The food service unit of the future may well be controlled by push-buttons. Such units will bring hot foods from the kitchen along a conveyor going directly to the hot section of the unit; cold foods would similarly be taken to the cold section. Beverages would be directly in front of the waitress at the touch of a button. Dishes, both clean and soiled, would each have their own conveyor. Orders would be tape recorded for a playback check. An accounting system would be right in the unit (all brain). Other advances will be electronic cooking; high-frequency dishwashing; cooking and lighting without heat; ductless ventilation; self-contained equipment, transistorized, eliminating connections to big power circuits; thinner insulating materials (refrigerators walls only ½ in. thick); refrigerators without doors (air walls will keep warm air out); and so on. The changes in equipment and design over the past thirty years are described also.

Beverage Dispensers. The beverage dispenser of tomorrow will offer a full selection of hot or cold coffee and chocolate, carbonated or non-carbonated grape and orange in one unit 5 by 7 by 11 in. The face of the dispenser will be divided into four compartments, each holding 1 qt. Pushing a red button will bring a hot or non-carbonated beverage; a blue button signals a cold or carbonated drink. It is also designed for completely automatic refilling, cleaning, and maintenance. An electronic unit the size of a half dollar will provide the same amount of refrigeration and energy now provided by compressors weighing 35 lb. and about the size of a basketball. The same degree of quality control now possible only in bottling plants will be provided.

Pouch Meals. Twenty continental cuisine entrées with a companion dish (beef Stroganoff with parsley buttered potatoes, chicken curry with almond rice pilaf, peppered steak with candied carrots) are now available in a divided, two-compartment plastic pouch. They are heated simultaneously and can be served in 10 to 12 min. Individual serving prices range from 60 cents to $1.50. Another cook-in-the-bag entrée is one which is placed in an electronic oven for 20 to 40 seconds. A motel in Minneapolis uses pouched foods for its entire meal. During rush periods, the electronic oven is supplemented by a drawer-type bun warmer; fifty punched items are put into each drawer and heated to 185° in 1 to 1½ hrs. Pouched foods remain usable up to 24 hr. when kept in the bun warmer. With either method, there is no preparation mess.

FOOD ENGINEERING

Vol. 32, October, 1960

*Nestlé pioneers "flavor" protein hydrolysates. L. Trauberman.—p. 48.

"Flavor" Protein Hydrolysates. It is well known that protein hydrolysates somehow enhance the flavor of a variety of foods. What is new, however, is the "tailoring" of plant protein hydrolysates for specific and reproducible flavor effects. Any protein source acceptable to FDA can be used. Available in liquid, paste, and powder form, the hydrolysates re-inforce at the sub-threshold level the flavors of soups, meats, poultry, seafoods, gravies, and sauces; they have built-in resistance to further flavor change during processing of foods to which they are added; and are entirely of vegetable origin and approved by FDA. Combinations of the various hydrolysates may be used to produce an infinite variety of background and predominant flavors. The original objective was to find a replacement providing an amino-acid balance and flavor similar to beef extract. Hydrolysates ultimately accepted as beef-extract replacements give a heavy beef flavor without the characteristic metallic background flavor of beef extract, bacteria counts are low, and storage stability is excellent. The manufacturing process of hydrolysates is explained.

FOOD SERVICE MAGAZINE

Vol. 22, October, 1960

*How to set up a master recipe file. M. K. Cranmore.—p. 37.
*Custom designed all-electric kitchen floor plans. D. W. Stewart.—p. 42
Peach Roma—dessert supreme. I. L. Dolan.—p. 55.

Recipe File. Standardized recipes help control food costs, insure production of consistently good food of uniform portion, and eliminate dependence on the whims of changing personnel. Sources of recipes are listed, and the mechanics of setting up a file are described. Teaching employees to use these recipes must be accomplished tactfully. Testing procedures are outlined.

All-Electric Kitchen Floor Plans. All-electric designs for nine kitchens are presented by members of two organizations of food service consultants. Along with each plan is a key to major kitchen equipment.

HOSPITAL MANAGEMENT

Vol. 90, November, 1960

*Weight loss by association. M. S. Tupper—p. 49.

Vol. 90, December, 1960

*Holiday desserts. I. L. Dolan.—p. 54.

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Team Reducing. Persons in the medical profession and hospital service who are overweight stand as poor spokesmen for medical advancement. Perhaps they should take a cue from published reports on group dieting and form a local hospital personnel reducing association. Ten to twelve members constitute a workable group. Such a program as carried out in a New York business firm is described. The results of this group agree with those of other studies. The subjects lost weight faster at the beginning than in subsequent weeks. Plateaus began to occur after about six weeks. This was the time when the special effectiveness of the group technique became apparent.

Holiday Desserts. Festive holiday desserts can do much to add to the dietitian's reputation for serving delicious food. This article presents interesting serving suggestions, as well as recipes for steamed date pudding and an orange sauce.

HOSPITAL TOPICS

Vol. 38, September, 1960

*Planning the dietary facility for a convalescent hospital. C. R. Pensinger.—p. 37.

*Feeding solids to newborns.—p. 67.

Food Service for Convalescent Hospital. The services of a food service equipment consultant were obtained to redesign the kitchen area of the new 65-bed Bonnie Brae Convalescent Hospital in Los Angeles. It was realized that the kitchen, as planned, could not be operated efficiently with a minimum amount of labor. The staff includes a cook-manager and two other employees; dietitians from a professional dietetic service act as supervisors. To make up for the inadequate amount of storage space, mobile storage cabinets were designed which could be moved directly to the cook's work section. Reach-in refrigerators were used with upper and lower doors. Inventories of food and kitchen supplies are to be kept at a minimum where it is possible to get daily deliveries. Air conditioning makes it possible to have windows located near the ceiling; no wall space is wasted, and there is no large of expanse of glass to be kept clean. Meals are served to patients in their rooms, from hot and cold food carts. A selective menu is used. Photographs of three-dimensional models of the kitchen are featured in the article.

Feeding Solids to Newborns. Feeding solid foods at two to three days of age and using a 6-hr. feeding schedule are methods used with success by two physicians, working independently of each other. A Miami pediatrician has observed 1040 infants on this routine, which begins with cereal on the second or third day of life. By the ninth week, a baby is taking strained vegetables, fruits, meats, orange juice, egg, custards and puddings, and crisp bacon in addition to cereal and milk. A similar regimen, prescribed by a doctor in Gnadenhutten, Ohio, is outlined. Details of both schedules are given. Criticism of such methods center on four points: (a) question of nursing, (b) frequency of allergies, (c) question of the baby's ability to swallow and assimilate these foods, and (d) allegation of the omission of the opportunity to manifest parental love. In addition to answering these criticisms, one of these physicians lists ten advantages of his schedule.

HOSPITALS

Vol. 34, October 1, 1960

*Food service supervisor training. N. Wier and R. C. Williams.—p. 72.

Vol. 34, October 16, 1960

*Keeping the patient in focus. E. C. Norman.—p. 102.

Food Service Supervisor Training. From 1956 to 1960, a food service supervisor training program was conducted in Georgia under the direction of the Georgia Department of Public Health. It was financed by funds from the Public Health Service. The history of the project is given. It was expected that twenty students would be enrolled in each class. The small enrollments of the first two years led to these conclusions: (a) The average hospital in Georgia of 100 beds or less cannot subsidize a member of its food service staff away from the hospital for eleven months. (b) The average person interested in food service work in hospitals in Georgia and adjoining states cannot finance this course away from home. As a result, classroom work was reduced to three months. The trainees returned to their hospitals or went to hospitals selected for them for additional experience under supervision. A certificate was granted to those completing both phases of the course. The fifth and final class received certificates in March 1960. The curriculum was planned to cover every phase of hospital dietary management (the curriculum is outlined). Evaluation of the program indicates that it should be continued on a permanent basis. As a result of the program, thirty-eight smaller hospitals in Georgia and nearby states have trained food service supervisors. Nineteen graduates are now serving as members of food service staffs in larger hospitals. Two are employed in nursing homes.

Patient Care. The goal of sound institutional administration must be the good for the majority. Consequently, the need for efficiency tends to obscure the individual. On the other hand, since feeding or eating has many related emotional factors, this phase of hospital service must be carefully handled. Following a discussion of the emotional and psychologic needs of the patient, the author points out that since the patient has entered the hospital in a regressed and dependent state, dealing with him must be based on a parent-child adjustment. The flexibility of the dietitian is important for evaluating the dependent behavior of the patient and adjusting herself to the needs of the moment. As with infants, it is necessary to be firm and definite; as with the young child, there is need for direction and a certain type of conformity. It is only when the behavior of the patient is comparable to an older child that suggestions can be made and initiative expected. If the patient responds in a mature fashion, the demands on the dietitian are greatly reduced. Since this type of personal attention on the part of dietary staff is time- and energy-consuming, there is no place for it in many efficient, smoothly running hospitals. It becomes the responsibility of the administrator to fit this patient-oriented facet of dietary operation into the organization.

INPLANT FOOD MANAGEMENT

Vol. 7, October, 1960

*Paper cup baking. p. 54.

Paper Cup Baking. Custard, a popular dessert in an aircraft company plant, is now being prepared in paper cups, eliminating much messiness and expense. (Cost per serving of the paper cup proved to be less than breakage alone would be using casseroles). Approximately 500 custards per day are prepared in 8-oz. squat paper containers. Baking is done in a deck oven, not a reel type, where revolving shelves might keep custard from setting. The custard recipe is included, along with photographs of the preparation procedure. Features of this industrial food service are included.

INSTITUTIONS

Vol. 47, November, 1960

*To freeze or not? L. H. Kotschevar.—p. 10.

*The zero zone.—p. 10.

*School lunch management. S. Hartt.—p. 18.

*Christmas comes to institutions.—p. 50.

*Sanitation for food service workers. T. M. Richardson.—p. 94.

*The alphabet of smoother staff relations.—p. 108.

*Characteristics of a good leader. W. E. Brunson, Jr.—p. 122.

*Pampering produce: a challenge in kitchen design. Part I. Planning receiving and storage areas. B. J. Freed.—p. 244.

To Freeze or Not. Seldom is the maximum usefulness of a freezer realized. Too often, premium freezer space is filled with a haphazard assortment of foods that should be stored elsewhere or not at all. Most institutions are not equipped with proper freezing facilities. Foods should be rapidly frozen at −40° F. or below to lock in rigidly the quality factors of color, texture, and flavor. Foods should be frozen (a) when unpredictable patrons fail to show up or when weather interferes with patronage; (b) when extra work must be planned for employees during slow periods; (c) when good quality specials can be obtained at low cost; and (d) when preparing ahead for unusually heavy work loads. Packaging hints for freezing are given, foods to freeze and those not to freeze are listed, food poisoning and sanitation procedures are discussed, and recon-

BUT DOCTOR, IS CALCIUM REALLY THAT IMPORTANT?

YES . . . and the importance of calcium is best observed in people who have always enjoyed sufficient amounts of milk. Shape . . . stature . . . locomotion . . . all are dependent upon the support given the body by the skeleton and its main constituent: calcium. Over 99% of this element in the body resides in the bones and teeth where it lends rigidity to these tissues and is stored for future needs. The remaining 1% serves several vital functions . . . in the clotting of blood, the activation of enzymes, and the transmission of nerve impulses to the heart and other organs.

In some areas of the world, low calcium, phosphorus and vitamin D intakes combine to cause growth retardation and bone deformities. Calcium intake must be adequate, along with adequate phosphorus and vitamin D, to treat infantile rickets and adult osteomalacia. Milk and milk products . . . particularly those fortified with vitamin D . . . more than any other food group . . . have been responsible for the infrequent occurrence of these diseases in the United States.

While growing animals are most susceptible to calcium deficiency, a low intake in mature animals can lead to *osteomalacia* . . . a disease characterized by decalcification and fragility of the bones. A deficiency in human adults is most likely to occur in women during pregnancy and lactation . . . when failure to consume adequate amounts of calcium may cause bone depletion in the mother and in the child.

Normal calcium metabolism is dependent upon several other factors, including phosphorus for bone salt formation . . . vitamin D and lactose for efficient calcium absorption . . . and protein for the synthesis of bone matrix. Thus calcium in the diet should be accompanied by all those nutrients necessary for its proper utilization. When milk is the source of calcium, these and other *PLUS* factors will also be provided.

Milk and other dairy foods stand alone in their ability to provide calcium needed for all body processes in a form that is highly palatable, easily digested, and readily absorbed . . . and they also provide other nutrients that contribute to a balanced dietary and buoyant health.

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stituting of frozen products is described.

Freezer Space. Food service facility planners should think in terms of a 20 to 60 per cent increase in consumption of frozen foods in the next few years. The operator must also decide how many days' supply it will be profitable to keep in storage. This number of days times the total weight of food needed each day will equal the maximum weight of food to be stored. There should be flexibility in arrangement of storage space since, as yet, container sizes in certain popular items are not modular standards. The advantages of both reach-in and walk-in freezers are cited. Purchasing pointers for reach-ins are listed and design considerations of walk-ins are brought out. While some freezing may be done in a storage freezer, best results are obtained in a −40° F. blast freezer, now available only for the largest institutions. It is expected that soon we will see smaller "freezing freezers" on the regular market.

School Lunch Management. There are three systems by which school lunches are operated: semi-centralized, centralized, and independent or single unit. Menu planning varies, too. In some instances, one menu is served, in others a menu may be à la carte, and some plans combine both types. Service may be cafeteria style, family style, or individual. Various semi-centralized systems of operation are described (usually accounting, purchasing, menu planning, employment and employee training, general policy making, and most of the functions except preparation and service are done in a central location). Complete centralization is explained. Nine advantages claimed for centralized operation are outlined, with discussion as to their applicability vs. semi-centralization. The importance of trained supervisors is stressed.

Christmas Theme. There is no other time of the year like Christmas to present foods and motifs with a holiday spirit. Four colorful salads show the holiday theme. Photographs of canapes, punch bowl, a buffet, and menus give further suggestions. Take-home Christmas favors are other ideas.

Sanitation Course. The use of the training course, "Sanitation for Food Service Workers," available from *Institutions Magazine*, can be implemented by means of a tape recorder. This is not to infer that a tape-recorded lecture is preferable to one presented by a "live" speaker. However, it may have advantages with an embryo instructor. It would also be possible to observe closely students' reactions. The busy owner or manager, qualified to give such talks but unable to spare the time, could tape the lectures and then turn the school over to a trusted assistant. Then it would be necessary for him to appear only at the final session or to drop in periodically during the question-and-answer period. This medium is worthy of experimentation.

Staff Relations Alphabet. The ABC's of more efficient staff relations start off with this reminder: "*A*bsenteeism can be held back only by strict enforcement of employee rules . . . *B*onus offers should always be attainable . . . *C*arelessness on the job should be constantly searched out . . ." This interesting account continues through the entire alphabet, ending with "*Z*ealous efforts to do a good job on the part of every employee come only where management proves that he or she has a desirable job that is worth holding onto."

A Good Leader. Most of our problems today are caused by the human element, forcing us to concentrate on good leadership. Characteristics of a good leader are: human relationship; decisiveness; earnestness; justice; common sense, judgment, and acumen; simplicity; and enthusiasm and perseverance.

Pampering Produce. If the full benefits of fresh fruits and vegetables are to be obtained, they must be properly refrigerated at the right humidity from the time they are delivered until the moment they are cooked or served. Not only kitchen design is involved, but also the attitude and systems of personnel. Receiving procedures are stressed, and the use of scales and kitchen utility trucks is explained. For primary storage of fresh produce, walk-in refrigerators are best because they allow the kitchen staff to uncrate and trim these foods under refrigeration. The size and construction of refrigerators are discussed, ranging from wall and floor construction to outside temperature gauges, doors, and shelf arrangement.

MODERN HOSPITAL

Vol. 95, October, 1960

*Acceptance Service keeps food standards high. J. T. Foster, J. J. Leydon, and N. Andreason.—p. 117.

*What's involved in hospital feeding costs? —p. 122.

*Acceptance service inspections assure uniform quality meats. J. Hartman.—p. 128.

Acceptance Service Purchasing Program. The Stamford (Connecticut) Hospital uses a federal food purchasing program—the Acceptance Service of the Department of Agriculture. This service has two main functions: (a) to help the buyer develop clear-cut specifications for his food purchases and (b) to examine food products prior to delivery to assure compliance with those specifications. The hospital is its own judge as to the quality standards it desires and can afford. Except in large cities where food vendors have become familiar with federal inspectors, initial resistance to the Acceptance Service can be expected. Although it provides grading inspection and certification that quality matches specification, it cannot attest to what happens to the shipment after the inspector seals the packages and during its delivery (acceptance seals can be broken, substitutions can be made, refrigeration can fail). Therefore, systematic receiving is still important. The program is designed to be self-supporting by its fees. Vendors pay the Acceptance Service charges, which are passed along in the vendor's price. Food cost records indicate that the combination of competitive purchasing and the Acceptance Service have stabilized costs during a period of continued inflation.

Survey of Hospital Food Costs. A survey was undertaken of about 130 hospitals to determine the cost and patient-relationships of food service; results are classified by region and size of hospital. Kitchen costs per patient day varied from a low of $2.11 in southern and southwestern city, county, and state hospitals to a high of $5.88 in western hospitals of 250 beds and over. Nearly nine-tenths of the hospitals had centralized kitchen facilities. A table gives the range of salaries paid to kitchen personnel (including dietitians, administrative personnel, and ordinary kitchen employees). In 83.2 per cent of the hospitals, a full-time dietitian was employed; 8.4 per cent employed a dietitian part-time; and only 6.3 per cent did not employ a dietitian. More than 90 per cent of the hospitals maintained a cafeteria for employees.

Use of Acceptance Service for Meats. The Functions of the Acceptance Service of the Department of Agriculture, as described in the article on Stamford Hospital, are outlined. In the past, each institution that used the Acceptance Service prepared and published its own specifications. Now, Institutional Meat Purchase Specifications have been developed, promising to eliminate confusion for meat suppliers and the meat graders who perform the Acceptance Service. Specifications have been developed for fresh beef, lamb and mutton, veal and calf, and pork. Those for cured and smoked pork, cured beef, sausage items, edible by-products, canned meats, and portion-control meats are in the development stage. A four-step procedure for inaugurating the program is as follows: (a) obtain copies of specifications from the Government Printing Office; (b) notify the nearest USDA meat grading supervisor that the institution is planning to use the Acceptance Service; (c) list items to be purchased, indicating grade, weight range, and state of refrigeration; and (d) obtain competitive bids and award contracts to low bidders.

NRA NEWS

Vol. 3, September, 1960

*The magic of European eating. G. A. Brewster.—p. 5.

*Unusual restaurant equipment and facilities in Europe. F. Schmid.—p. 12.

European Eating. Pictured here, through vivid description, are many of the delights to be found in eating in Europe. Complete menus, served in London speak for themselves, indi-

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In these 20 years, what has happened? Within 10 years—clinical beriberi, pellagra and ariboflavinosis practically disappeared in the U. S. After 20 years, we now have two generations of younger Americans whose diet includes generous supplies of thiamine, riboflavin, niacin and iron—largely provided through the enrichment of breads, flour and macaroni foods.

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cating quality and atmosphere. Stops in Germany, Switzerland, Austria, Italy (including Venice, Florence, Milan, and Rome), and France gave opportunity to enjoy the specialties of each area and city. The careful preparation, the gourmet touches are described, giving indication of perfection achieved through love for the profession.

Restaurant Equipment in Europe. Although high air circulation ovens have been available in the U.S. for only about a year, this type of oven has been used for a number of years in Europe. Much of the standard coffee- and tea-making equipment has the hot water boiler below the top of the urnstand, with only the coffee- and tea-making equipment above the top. Bulk butter is still used and forced through butter cutting machines that produce interesting shapes. Island-type ranges are popular and are still fired by a variety of fuels. Fresh air supply ducts are brought under floors to the fire box. Overhead vent hoods are formed of transparent wired glass. There is usually a clear shelf or rack over the range so that the view across is unobstructed. Many kitchens are exposed to view. One common item, not found in our country, is an electrically heated, thermostatically controlled, tilting braising and frying kettle with a pouring lip at the front edge. The American influence in labor-saving ideas and equipment is taking hold. European food costing methods are described.

PROFESSIONAL NURSING HOME

Vol. 2, October, 1960

*Some vital facts about vegetables. N. D. Robertson.—p. 8.

Vegetable Facts. Basic information is given on the place of vegetables in the diet—their nutritive value. Buying hints are included for frozen and canned vegetables. Preparation procedures are discussed. Descriptions are included for seven ways to cook vegetables: mashed, boiled, scalloped, broiled, creamed, glazed, and browned or fried.

PERSONNEL JOURNAL

Vol. 39, October, 1960

*Creative thinking can be released and applied. S. J. Glass.—p. 176.

*The older office worker—backbone of American business. M. F. Rorayne.—p. 178.

Creative Thinking. What has been done to motivate the individual to greater and more intelligent productive effort? The greatest blocks to productivity are the daily fears: selfishness, oversensitivity, rigidity, indecision, indifference, complacency, laziness, and conservatism. They come in the form of hostility, defensiveness, tension, anxiety, belligerence, conformity, apathy, silence, headaches, fatigue, ulcers, high blood pressure, heart attacks, and similar bodily symptoms. Experience shows that there are several training designs through which organizations can unleash the potential, positive, constructive energy of each individual. One such design is the use of small *horizontal* groups, limited to twelve supervisors, managers, or executives from the same or other organizations. Another effective design is the use of small *vertical* groups where the personnel work together daily in close interaction. The secret in releasing the creative potential within people is to permit healthy conflict and deal with it in a constructive manner. The most important member of the training design is the catalyst (trainer) whose role is to guide and supervise the group through democratic action. A successful approach to both horizontal and vertical group action is through the use of a "business gaming" or "simulation device" in which all participants become intellectually or emotionally involved for a period of 4 hr. This performance sets the stage for an unstructured, spontaneous discussion which becomes the heart of the session and which permits the release of all negative forces. A unit which moves through this process will unblock, and each individual becomes a spark plug which sparks others to thought and action.

The Older Office Worker. For each industrial worker hired today, American business must hire another two, three, or more clerical workers to support him. The shortage of competent office workers is a fact and promises to continue. One solution is more effective use of the older workers. This is not being done because of employer ignorance and resultant prejudice against hiring workers over forty, or retaining present ones over seventy years of age. A number of instances are cited which prove the value of employing older workers.

SCHOOL LUNCH JOURNAL

Vol. 14, October, 1960

*The underfed. J. Hundley.—p. 17.

*Cultural patterns in the American diet. M. Mead.—p. 20.

*A community becomes nutrition conscious. H. Massengale.—p. 40.

*Educating adolescents in proper diet. C. M. Young.—p. 48.

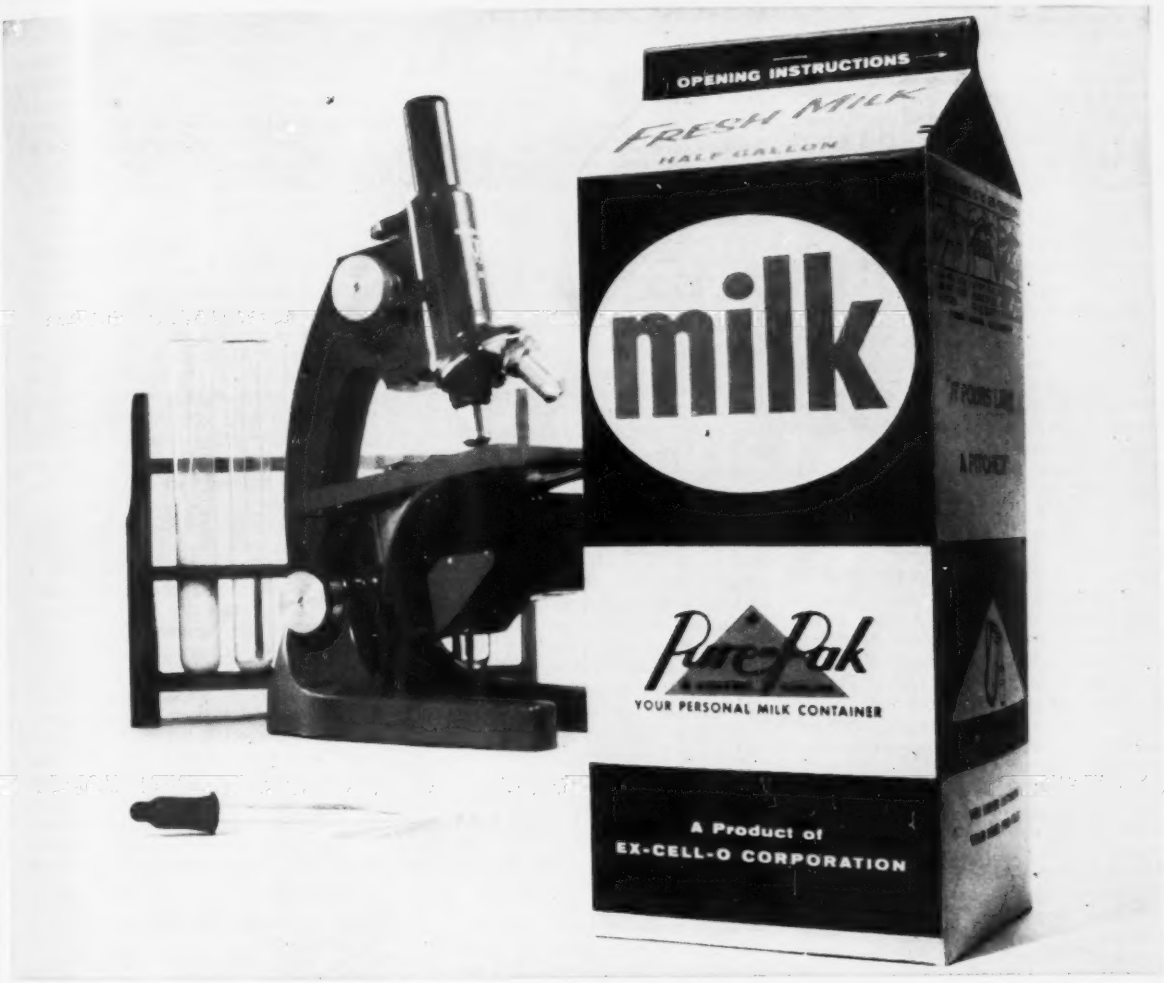
*Reflections on supervision. J. M. Ryan.—p. 60.

*Nutrition activities in the elementary schools. M. M. Hill.—p. 64.

The Underfed. Although the trend in our country is toward a better diet for a greater number of people, there still remains a significant percentage of families not receiving a diet as good as it should be. This is shown by nutrition surveys and statistics such as these: in 1957, 781 deaths in the U.S. were reported due to general malnutrition or multiple deficiency states. A study of certain groups also bears out this situation. The 370,000 American Indians living on reservations, until quite recently, had a health status approximating that of the entire country sixty years ago. There are an estimated 750,000 U.S. citizens and another 500,000 foreign nationals who are dependent on migrant agricultural work for a living; their diets are precarious and poor. Our cities all contain less favored socio-economic groups whose diets range from poor to inadequate. Among the general population, age-sex groups pose special problems (children old enough to exercise ideas about what they will eat, older people with disabling illness and limited economic resources, citizens limited in diet for medical reasons, and those influenced by nutrition fads and other mistaken notions about food). It is evident that socio-economic and cultural factors inherent in our life constitute the most important causes of malnutrition. The true significance of the revolution in the American diet lies in its influence on health. Science has made it possible to postpone the fatal effects of chronic diseases and injury, but the amount of disabling illness has increased vastly in the past twenty-five years. More information is needed on: (a) the relations of dietary habits to degenerative processes of aging (particularly to atheroma and growth rate of tumors); (b) effects on health of chemical and physical treatments in processing of foods; (c) effects of various foods and dietary habits on the efficiency and working capacity of the industrial population; (d) effects of diet on resistance to infections; and (e) the constitution of diets most favorable to all stages of human growth and development.

The American Diet. Our patterns relating to food are undergoing a profound change. In the rural society of one hundred years ago, it was vitally important to get "enough" to eat. Over the years, our patterns have included over-refined, sweet foods; now, with post-war prosperity, we are confronted with a diet described as *too* nourishing. The continual effort not to eat too much, not to gain weight, has produced pockets of malnutrition for adolescent girls and pregnant women in particular. Every part of the culture (chain store, drug store, soda fountain, food dispensing machines for work breaks) is organized to provide more food than anyone can be allowed to eat without some kind of repatterning. We need new ways to maintain the warmth of human relationships through food given and received, or shared, which will fit the bountifulness and high quality of our food to the kinds of lives we lead today.

Community Action in Nutrition. A food habit study, made in Hugo, Oklahoma, indicates what studies elsewhere have shown. Half the girls fell short of the recommended amounts of ascorbic acid and vitamin A. Forty per cent were short in calcium. About half were eating more than the recommended calories for their age and sex. As a result of the study, an education program has been instituted. The school lunch program receives major emphasis. In order to better merchandise the food, plan adequate



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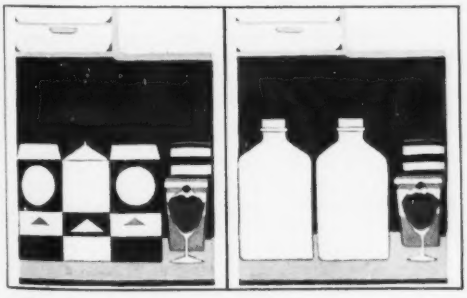

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meals, and practice better buying management, lunchroom supervisors from all the schools meet bi-monthly with the area lunchroom supervisor, homemaking teachers, and the superintendent. Nutrition education is being integrated into many areas of study, including general science, agriculture, biology, homemaking, speech, French, Spanish, and English. Spot announcements on the radio are broadcast daily during the school year. One adult class in nutrition education is under way. Further expansion of the program is being planned.

Educating Adolescents. This well documented article reviews what is now known about the nutrition and eating habits of adolescents. It becomes apparent that there are four areas of needed research: (a) What are the food attitudes of children and how do they come about? (b) How effective are the teaching methods which have been used? (c) How does one bring about changes in food habits once established? (d) What is now being done in the way of nutrition education for teen-agers? Some "educated guesses" about teaching nutrition to teen-agers are set forth. For instance, educational efforts must be based on appeals which are meaningful (physical fitness—endurance, ability to compete; appearance—in concrete terms; social acceptance). Ten suggestions for parents or other adults to apply in working with teenagers have been culled from the experience of Dr. A. Roth on the basis of his experience as Director of the Teen-Age Clinic at the Permente Medical Group in California. The influence of the two most important areas of life on food habits—the home and the school—is analyzed. Considerable attention is given, also, to the education of adults. Surveys of homemakers point up the part which formal schooling has played and indicate the role which informal education via mass media could play in the future in relation to nutrition education.

Personnel Supervision. A descriptive check list for evaluating a personnel program is presented. Details are outlined under these headings: classification, pay, and performance; selection of personnel: employee orientation; communication; and gripes and grievances.

Nutrition Activities in the Schools. A number of actual projects which have been carried on by pupils in both elementary and secondary schools to strengthen nutrition education are reported. These took place in various courses—social studies, English, art, science, and so on. Further instances are cited in which parent cooperation was obtained. The team approach to nutrition education is explained (involving school, home, and community), and demonstration programs in nutrition education are described as conducted in Ascension Parish, Louisiana; Cape Sable Island, Nova Scotia; and New York City Public School 105.

VOLUME FEEDING MANAGEMENT

Vol. 15, October, 1960

*Kitchen design objective: 20% work reduction, 50% space reduction.—p. 17.
*Canned vegetables . . . as simple as seasoning. E. Blair.—p. 24.
Soufflés . . . show stoppers.—p. 27.
*Breading . . . a crisp wrap for juices and flavor.—p. 30.
*Chemistry spurs better sanitation.—p. 42.
*Chairs and tables.—p. 65.

Kitchen Design Objectives. The new feeding facility at Fordham University was grouped for efficiency and suspended for sanitation. The main cafeteria seats about 1000. The building also includes a student "hangout," a large meeting hall serving up to 2000 people, and ten smaller rooms which can serve 50 or more. Diagrams help visualize cross sections of such items as the basic cafeteria serving counter, cold plate and hot pan for counter service, wall-mounted kettle and steamer, and wall-mounted detail for sinks, shelves, and tables. Photographs show scattered cleaning stations, a mobile table, a fabricated dual-temp center island for ice cream and milk, a bussing cart, and cantilever supports for display shelves.

Canned Vegetables. Vegetables are an important part of diet, and in restaurant service, they are convenient. Customer satisfaction, however, depends on preparation. Several seasoning tips are given for each of these vegetables: green beans, tomatoes, corn, green peas, asparagus, beets, carrots, onions, spinach, and Lima beans. Quantities of seasoning are for one No. 10 can of vegetable. Interesting vegetable combinations are suggested, too.

Breading. The function of breading is to seal the natural juices and flavor in, seal the fat out, and give an appetizingly browned, crisp-coated, finished product. A number of factors determine what is a good breading. One requirement is the ability to cling to food (a batter is a help, certain ingredients such as potato flour help develop good adhering qualities in the batter portion, and granulation of the breading makes a difference — coarse particles cling better). Techniques of dipping in batter and breading are given. Rate of browning must be considered, too; the browning rate is determined largely by the amount and type of sugar present in the breading material (a breading with a high level of a quick-browning sugar, such as lactose, would be appropriate for a food calling for a quick browning; breading for a long-cooking item should contain little or no sugar).

Chemistry of Sanitation. Sanitation is taking great strides due to research. The most important advancements have been made in the synthetic detergents, which comprise about 72 per cent of all detergents produced. Low-foaming detergents for dishwashing or laundry are the result of research. Another advance is synthetic bar soap which will out-perform and outlast soap cakes. The application of automation to cleaning can be seen in the blending of detergent ingredients at the point of use; quality is improved and the hazard of handling powerful detergents is eliminated. Another area of product growth is liquid detergents. Chlorine-type sanitizing agents represent one of the most efficient, non-selective, and economical bactericides. Other useful agents in cleaning are the iodine sanitizers (effective on vegetative cells, but not good sporacides). Problems still to be overcome in the use of these products are pointed out. The improved standards offered by new product research will be effective only as they are accepted and applied in a sanitation program.

Evaluating Chairs and Tables. What should you look for in chair design? *Answer:* lightweight pieces with a minimum of cross pieces and stretchers—modern variations of classic designs. What are important chair construction details? *Answer:* These are given for wood and metal chairs. How can you evaluate stacking chairs? *Answer:* weight is a factor, lighter chairs getting rougher treatment; they should be extra durable. The newest in folding chairs, the best type of table top, features of folding tables, good booths, and practical upholstery material are considered, too. Products of seven manufacturers are pictured and described.

WHAT'S NEW IN HOME ECONOMICS

Vol. 24, November, 1960

*Foods for holiday giving.—p. 32.
*The nutrition status of the teen-ager. G. H. Berryman.—p. 34.

Teen-Age Nutrition. With the aid of charts, tables, and reports of food intake surveys, the nutritional plight of the teen-ager is portrayed: (a) The older the child, the poorer is the diet. (b) The nutrients most commonly lacking are calcium and ascorbic acid Iron is often low in teen-age girls' diets. (3) Vitamin A, thiamine, and riboflavin are also low in the diet in certain sections of the country. (d) The adolescent girl is the poorest fed member of the family. The most basic corrective measure in this situation is the improvement of the diet. There may be some question, however, about the tractability of the teen-ager towards a conformity which would conflict with the customs of his age group. Therefore, where teaching new food habits is more a theoretical than a practical objective, supplements may be the answer. This conclusion is consonant with the principle that preventive measures as well as therapeutic measures have established places in medical practice.

Holiday Food Gifts. Instructional principles involved in making candied pineapple for gifts are high lighted in this article.

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The relative unpalatability of special diets often leads to dissatisfaction and even "cheating." The juice of fresh Sunkist lemons has been found most useful in improving the palatability of these 3 common regimens:

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BIOGRAPHICAL NOTES FROM THE HISTORY OF NUTRITION

Stephen Moulton Babcock—October 22, 1843–July 1, 1931

"I would like to have known him" is the ever-present thought as one reads of the life and work of Stephen Babcock. That gaiety of spirit, the laughter he brought to the laboratory, his insatiable curiosity and questioning of all statements, coupled with a brilliant mind and pioneer spirit in research, make us wish we could meet his kind more often.

The world knows the name of Babcock because of his test for the amount of butterfat in milk, introduced in 1890. This test makes it possible to pay for milk as delivered to the butter and cheese factories on an equitable and impartial basis.

Less well known is Babcock's pioneer work in nutrition. At the time he went to the University of Wisconsin (1888), leaders in the field believed that the energy value of an animal feeding ration was the measure of its nutritive value. Babcock questioned this as he questioned everything and wanted to experiment for himself. He obtained the loan of two heifers from the Animal Husbandry Department. One on a balanced (by chemical analysis) all-oat ration died and the other prospered on a similarly balanced corn ration, but was hastily reclaimed by the Department. Cows were expensive.

Later when E. B. Hart became head of the Department, Babcock's ideas were developed into a full-scale experimental study and the results published in the now famous Bulletin 17 of the University of Wisconsin (1911).

It was from Stephen Babcock, scientist of vision and wisdom, that McCollum in 1907 received the enthusiastic support and encouragement to begin his far-reaching nutrition studies using small animals as the basic research tool.

Stephen Moulton Babcock was born in Bridgewater, New York, on October 22, 1843, the son of Pelig and Mary (Scott) Babcock. He received his bachelor's degree from Tufts College (1866) and then went to Rensselaer Polytechnic. He intended to become an engineer, but on the death of his father, he returned home to manage the farm until 1875 when he went to Cornell University as an instructor in chemistry. Two years later he went to Germany to study at the University of Gottingen in Wohler's laboratory, and received his doctoral degree there in 1879. The next year was spent teaching chemistry at Cornell and in 1882 he was appointed Chief Chemist at the Agricultural Experiment Station, Geneva, New York.

In 1888, Babcock went to the University of Wisconsin as Professor of Agricultural Chemistry and Chief Chemist of the Agricultural Experiment Station. The rest of his life was spent at Wisconsin. There he used his basic knowledge of mathematics, physics, and chemistry on studies on the constitution of matter (to which he devoted the last two decades of his life), on metabolic water (liquids produced in the bodies of insects living on dry matter), and on agricultural chemistry and animal nutrition.

Babcock worked alone; he did not want an assistant, and his imaginative mind preferred to make his own apparatus. He wrote comparatively few papers and liked to mull over problems in his mind and subject them to critical analysis, then tackle them in the laboratory with a fresh, new approach. Many honors came to him: honorary degrees from Tufts College (1901) and the University of Wisconsin (1917); a bronze medal from the Wisconsin legislature (1899), "grand prize" of the Paris Exposition (1900) and the St. Louis Exposition (1904); silver medal from the Swedish Government (1908); and the first Capper Award for Distinguished Service to Agriculture (1930).

In 1896, Babcock married May Crandall; they had no children. He retired in 1913, but until his death, in 1931, he was active in research and went daily to his laboratory.

REFERENCES: Russell, H. L.: Stephen Moulton Babcock. Science 75: 86, 1931; Hart, E. B.; Stephen Moulton Babcock. J. Nutrition 37: 3, 1949; Minutes, Regular University Faculty Meeting, Univ. of Wisconsin, October 5, 1931; Ihde, A.. J., and Schuette, A. H.: The early days of chemistry at the University of Wisconsin. J. Chem. Educ. 29: 69, 1952.—*Contributed by E. Neige Todhunter, Ph.D., Dean, School of Home Economics, Univesrity of Alabama, Tuscaloosa.*

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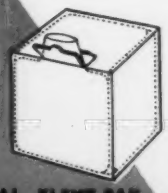

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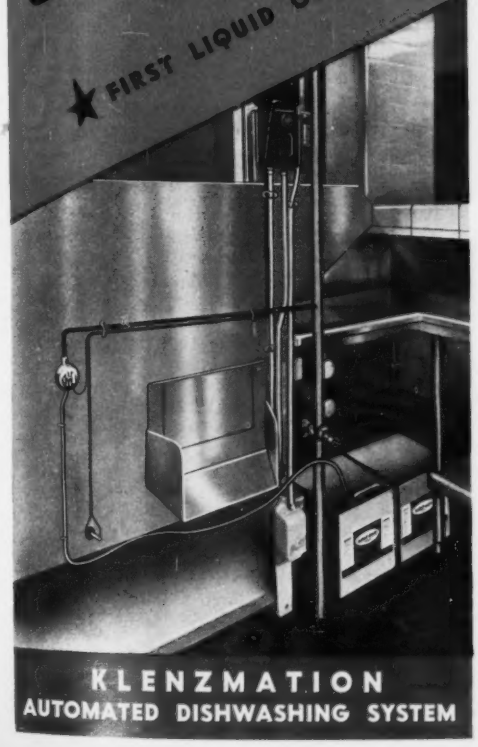

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New Society. An organizational meeting of The Hospital, Institution, and Educational Food Service Society was held on October 21, 1960, in the Sheraton-Cleveland Hotel during the time of the 43rd Annual Meeting of The American Dietetic Association. Sixty-four persons attended, representing educational programs for the training of food service supervisors at Michigan State University Continuing Education Center; Pennsylvania State University Extension Service; Jane Addams Vocational School, Cleveland; and Irwin Vocational School, Pittsburgh.

The objects of this Society shall be to: (a) promote education in schools, hospitals, and other institutions in the nutrition practices of human beings and in food service; (b) advance the science of food service for the general public welfare; and (c) improve nutritional services. The new Society has established educational and experience standards and adopted a code of ethics.

The first officers elected are: President, Mary Lou Milton, Obion County General Hospital, Union City, Tennessee; President-Elect, Elsie Lundin, Francis A. Bell Memorial Hospital, Ishpeming, Michigan; Secretary, Mary E. Jump, The Wells County Hospital, Bluffton, Indiana; and Treasurer, Josephine Dorko, Cleveland Metropolitan General Hospital.

Further information concerning the Society may be obtained by writing The Hospital, Institution, and Educational Food Service Society, Room 420, 620 North Michigan Avenue, Chicago 11.

Research Recommendations. Members of the USDA's Food and Nutrition Research Advisory Committee at a recent meeting emphasized the need for more information about fats and fatty acids in human nutrition. The complex role of fats in nutrition and the seriousness of disturbed fat metabolism is now recognized, but research is needed to determine the processes involved and factors affecting the utilization of specific fats and fatty acids. Research should be expanded to learn how metabolic response to different kinds and amounts of fat is affected by other elements in the diet and by age. Present knowledge is also inadequate for interpreting many research findings on the effects of dietary fat on human health. Consequently, more comprehensive data on fatty acids and other lipid components of foods should be obtained with improved methods now available.

The committee also pointed out the need for information on the biologic values of foods for various nutrients and the effect of major elements in the diet on utilization of these nutrients. Especially needed is new knowledge of the value of ordinary foods as sources of proteins and amino acids.

Up-dating and expansion of the USDA's food composition tables were also recommended. These tables should include: (a) content of new and different food items, including those used in Alaska and Hawaii; (b) new forms of foods on the market; (c) additional nutrients not formerly included in food tables, and (d) improved information on the fatty acid content of food.

Other needs pointed up by the Committee are for food plans at different cost levels for a variety of institutional feeding programs and a basic primer on nutrition for the use of teachers and consumers. Food consumption figures on the kinds, amounts, and costs of food consumed by different groups in the U.S. are needed for educational and marketing programs.

Miss Horton Retires. Mildred Horton, for fourteen years Executive Secretary of the American Home Economics Association, was honored on November 22 at a retirement dinner. Tributes were paid her by representatives of the profession, national and governmental organizations with which she cooperated, the officers and executive board of the Association, and the AHEA headquarters staff. Dr. Dorothy S. Lyle, AHEA President, presented Miss Horton with a charm to add to the gold bracelet she received during the Association's fiftieth anniversary in 1959. Each of the ten charms on the bracelet are symbolic of one of Miss Horton's contributions or milestones relative to the Association, the new one being a replica of the U.S. Capitol with the date of November 22, 1960, to remind her of the dinner in her honor. An amusing skit, "Never a Dull Moment" was presented by AHEA members and staff, portraying "fourteen years of life of an executive secretary." Special tribute was also paid to Miss Horton at the 51st Annual Meeting of AHEA last June, when she was awarded a special citation of service and an AHEA Research Fellowship was renamed in her honor.

Miss Horton was succeeded as Executive Secretary on December 1, by A. June Bricker, Ph.D., formerly Director of Field and Community Health Bureau, Metropolitan Life Insurance Company. She has also held positions as Assistant Therapeutic Dietitian, University of Michigan Hospital; Dietitian and Assistant Director of Residence, New London, Connecticut; Nutritionist, Boston Community Health Association; Community Nutritionist, Council of Social Agencies, Manchester, New Hampshire; Nutrition Director, Connecticut Dairy and Food Council; and Director, Home Economics Bureau, Metropolitan Life Insurance Company. She is a graduate of Battle Creek College and served a dietetic internship at the University of Michigan Hospital. This fall she completed work on her doctoral degree at New York University, from which she also holds a master's degree. At a tea held in her honor in October, by the New York State District Home Economics and the Greater New York Dietetic Associations, Miss Bricker was presented with a life membership in the AHEA "as a token of appreciation for her contributions to home economics in this area of the country." She is also an active member of A.D.A., having served as Public Relations Chairman and currently holds the elective office of Speaker-Elect of the House of Delegates.

Dr. King, President-Elect of APHA. At the recent meeting of the American Public Health Association, Charles Glen King, Ph.D., took office as President-Elect of that organization. Dr. King, who is Executive Director of The Nutrition Foundation, Inc., is well known to dietitians and nutritionists, and has been an honorary member of our Association since 1958.

Other officers of APHA are: President, Marion Sheahan, R.N., Deputy General Director, National League for Nursing; Vice-Presidents—G. R. F. Elliott, M.D., Vancouver, Canada, Humberto Olivero, Jr., Guatemala City, and Margaret F. Shackelford, Oklahoma City; and Chairman of the Executive Board, John D. Porterfield, M.D., Deputy Surgeon General, U.S. Public Health Service.

Food Prospects for 1961. Food supplies through 1961 are expected to be a little larger than in 1960, with per capita consumption about the same, according to estimates published by the USDA in the November issue of *The National Food Situation.* Among the individual major foods, civilians can expect to have more beef, veal, and poultry meat per person this year. Beef consumption per person may be at the all-time high of about 90 lb., but pork consumption per person is likely to be lower than last year. Small increases are expected for margarine and frozen vegetables, but there may be some reductions in consumption of dairy products, eggs, and canned juices. Supplies of tree nuts this winter will be very large. There will be more potatoes, but fewer sweet potatoes per capita. Data compiled by the Institute of Home Economics indicates that there will be little change in per capita nutrient level of food intake this year.

In a special publication on *The Vegetable Situation,* the USDA predicts that supplies of all frozen vegetables available in the first half of 1961 will be about the same to slightly larger than last year, although corn and green peas will be significantly smaller. Over-all supplies of canned vegetables will be a little smaller this year, but gains will be seen for snap beans and sauerkraut, which will be offset

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by decreases in green peas and sweet corn. A few less dry beans are available, and many less dry peas and sweet potatoes.

Plentiful Foods MONTHLY LIST

The USDA predicts that the following foods will be in plentiful supply during January:

Beans, dry
Cabbage
Chickens—broilers and fryers
Cranberries
Lamb
Olives, canned ripe
Onions
Potatoes

Frozen Foods in the New Year. The National Association of Frozen Food Packers reminds us that good resolution to manage meals even more efficiently, increase their variety, and make them more attractive in 1961 can be implemented with the use of frozen foods. The following are its suggestions for this month:

Frozen fruits

APRICOTS—Can provide a good source of vitamin A in school and hospital menus; in all menus, they furnish attractive color and natural flavor.

CHERRIES—Use for tart meat sauces, as well as in pies and turnovers.

RED RASPBERRIES — When served in meringues, they provide a very special dessert, with the assets of holding their shape as well as being both bright-colored and bright-flavored.

CONCENTRATED CITRUS JUICES—Place them on the menu both as a dinner appetizer and for a breakfast eye-opener.

Frozen vegetables

ASPARAGUS — Will please patrons longing for spring in January.

SPINACH—Makes oysters Rockefeller more colorful and appetite-enticing.

POTATO PRODUCTS—Come prepared in many different ways to provide menu variety with decreased labor cost.

FROZEN PREPARED FOODS—New ones, both heat-in-the-bag and heat-in-the oven, are available.

White House Conference on Aging. Final plans for the White House Conference on Aging, to be held for four days, beginning January 9, were completed during November. The chief decision of the National Advisory Committee was that the immediate objective of the parley would be the development of policy statements covering the twenty subject-matter areas of the Conference. This approach will serve to consolidate and focus major findings and recommendations, since the policy statements will grow out of recommendations drawn up by the delegates at the work-group level.

Some 2800 delegates are expected to attend the Conference, representing fifty-three states and territories and three hundred national voluntary organizations. Nelda Ross Larsson and Corinne Robinson will serve as A.D.A.'s representatives at this meeting.

Dates to Remember. From February 13 to 17, the *American Hospital Association*, in cooperation with A.D.A., will sponsor an Institute on Dietary Administration in Oklahoma City. The Institute is a part of the program of Continuing Education of A.D.A. Subject matter will be directed toward administration, including supervision and delegation of duties, as well as interdepartmental relationships. The program will include formal speeches, informal group discussion, and audience participation. Two workshop sessions are planned, so that participants can actually work on projected needs in their respective positions. Further information may be obtained from the American Hospital Association, 840 Lake Shore Drive, Chicago 11.

* * *

"The Dietitian—Her Orbit of Influence" will be the subject of a three-day, live-in workshop May 15 to 17, at Pacific Grove, California. The program will be presented by Continuing Education in Medicine and the Health Sciences, *University of California Medical Center*, San Francisco, and University Extension, Northern Area, in cooperation with the California Dietetic Association.

With the purpose of defining more clearly the role of the dietitian in her relationship with those whom she meets in her job, consideration will be given to: her professional role in planning for health, her managerial role in relations with staff and hospital administrators, her public role in relation to patients. Discussion will be directed toward heightening the dietitian's awareness of the importance of communications, increasing her understanding of human behavior, and effective ways of meeting current challenges to the accepted sphere of the dietitian.

A fee of $35 will be charged. Further information may be obtained from: Department of Conferences, University Extension, University of California, 2441 Bancroft Way, Berkeley 4.

Two-Day Post-Graduate Course. A post-graduate course for dietitians was conducted December 2 and 3 in Dallas at The University of Texas Southwestern Medical School in association with The University of Texas Postgraduate School of Medicine. The program included:

"Requirements in Deficiency States" —Dr. Arthur Grollman
"Malabsorption States" — Dr. Ivan Danhoff

"Special Surgical Problems" — Dr. Tom Shires
"Protein Malnutrition in Infants"—Dr. Grace Goldsmith
"Nutritional Problems in Juvenile Diabetics"—Dr. Edwin L. Rippy
"Problems of Adequate Nutrition in the Face of Dietary Restriction Due to Allergy"—Dr. Frederick Grover
"Psychiatric Eating and Non-eating Problems"—Dr. David Fuller
"Role of Nutrition in Liver Disease" —Dr. Burton Combes
"Niacin and Tryptophan Metabolism" —Dr. Grace Goldsmith
"Endocrine Factors in Relation to Nutrition"—Dr. Holbrooke Seltzer
"Protein Metabolism and Nutrition" —Dr. Donald Wiggans
"Fats—the Desirability of Restriction or Alteration in the Fat Content of the Diet"—Dr. Marvin Siperstein
"Nutrition in Chronic Wasting Disease"—Dr. John S. Chapman

Additions to A.D.A. Library. Frieda L. Meyer, Ph.D., of the University of Alabama, has been in correspondence with dietitians in several European countries and Australia. As a result of this correspondence, a number of publications in German were sent to Dr. Meyer, which she has now presented to the A.D.A. Library. These are available for loan to members who read German. They include: five issues of a publication, *Diat im Haushalt—Ahleitung und Rezepte;* two issues of *Krankenernahrung;* and individual issues of two other periodicals.

Other recent additions to the A.D.A. Library which are available for loan to members are:

Therapeutic Meal Plans—A New Diet Manual (revised edition) by the Department of Dietetics and Nutrition, University of Kansas School of Medicine, Kansas City, Kansas
Cooking Out-of-Doors by the Girl Scouts of the U.S.A. (a recipe compilation—each recipe scaled for 12 servings)
Manual of Diets for the Des Moines Hospitals by the Des Moines Dietetic Association
Cycle Menus—General and Modified Diets, developed as a Diet Therapy Project by the Kansas Dietetic Association in cooperation with the Kansas State Board of Health and the Kansas Hospital Association
Hospital Cook's Short Course developed as a Diet Therapy Project by the South Dakota Dietetic Association in cooperation with the Division of Home Economics, South Dakota State College
Low Caloric Diabetic Cook Book by the Dietary Department, VA Hospital, Houston

Agricultural Charts and Graphs. A thick booklet of *Agricultural Outlook Charts/1961* has been issued by the USDA's Agricultural Marketing Service. In it are included 148 graphs or charts, as well as 103 tables of statistical information on agricultural production and other aspects of this nation's agriculture. The charts are also available for purchase separately, at prices listed in the publication.

Included in the section on "family living in low-income rural areas" are charts on production of food for home use, comparisons of sub-standard diets in farm and nonfarm families, and value of food per person in farm and nonfarm families. Other charts of interest deal with the proportion of fat in milk (it is decreasing); value of beef and milk consumption; poultry production; production of fats and oils; per capita use of vegetables, potato and sweet potato crops, trends in fruit production and processing, and so on. The tables provide the data used in making the charts.

Copies of this booklet may be ordered for 50 cents each from the Government Printing Office, Washington 25, D .C.

Other Government Publications. Three new reports have been issued by the USDA's Agricultural Marketing Service.

The first, "Milk Consumption by Children at School and at Home in Relation to Special Milk Program" (Marketing Research Report No. 408), reports that children in grades 5 through 9, attending schools participating in the federal Special Milk Program, consumed 7 per cent more milk at home and at school during a representative 24-hr. period than children from other schools. The children in the Special Milk Program schools drank nearly one-third more milk at school. Both groups drank about the same amount at home. The effect of the Special Milk Program appeared to be twofold: it is increasing the level of intake among regular milk drinkers and also increased the number of milk consumers. The effect was especially pronounced in low-income areas, where per capita intake of whole milk was nearly 4 oz. more for children in schools participating in the Program than for those attending other schools.

Consumption of Processed Farm Foods in the United States (Marketing Research Report No. 409), the second publication, reports that between 1925 and 1954, the proportion of the total civilian supply of farm foods commercially processed beyond the minimum necessary for retail sale as fresh or raw, as by canning, drying, curing, freezing, or baking, rose from 25 to 35 per cent. During this thirty-year period there was a ninefold increase in frozen foods and a 275 per cent rise in canned foods. In contrast, consumption of milled grains without further commercial processing into bread, other bakery products, or mixes, decreased 40 per cent. Data are reported on the basis of urbanization and real income, as well as with respect to other factors affecting food usage.

Food and Your Weight (USDA Home and Garden Bulletin No. 74) is a thirty-page pamphlet written by

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DuBois Chemicals
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This attractive booklet is a guide to better food and food service in the small institution. Based on normal nutritional requirements for adults, the menu patterns, sample suppers, and pointers on meal planning have their place in any household. Practical ideas for making the work of the manager easier and pleasanter include a weekly marketing guide, hints for economy in buying and storage, and suggestions for serving. This is a project of the Diet Therapy Section of The American Dietetic Association.

Single copy 50¢

Five copies $2.00
Ten copies 3.75

Order from:

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620 North Michigan Avenue
Chicago 11, Illinois

Louise Page and Lillian J. Fincher of the Institute of Home Economics for use by lay people. The contents include discussions of daily caloric need, basic weight-control facts, planning meals and menus, suggestions for reducers, and suggestions for those who want to gain weight. Fourteen pages are devoted to the tables of calories in foods, presented in terms of household measures. Three sets of daily menus are given, showing a diet of 1200 calories a day and one of 3000 calories, built around the same foods. The value of exercise is emphasized in a section showing how increased regular activity alone can cause a slow but steady weight loss, provided food intake remains stable.

Single copies of these booklets may be requested from the Office of Information, U.S. Department of Agriculture, Washington 25, D. C.

Bulletin on Food Cost. "Analyze Your Food Cost" by John M. Welch has been issued as the University of Missouri Agricultural Extension Service Circular 723. In it, Mr. Welch considers: the cyclical menu; the procedure of keeping a "sales history" by means of a marked menu; the problem of standardization of specifications, recipes, and portions; purchasing, receiving, and storage; simplified accounting controls; and graphing customer flow for use in scheduling food production. Single copies of this bulletin will be sent on request to: Food Service Industry Program, Agricultural Extension Service, Room 231, Mumford Hall, University of Missouri, Columbia.

Army Personnel Announcements. The following changes in dietetic personnel have been announced by the Army Medical Specialists Corps:

ASSIGNMENTS TO ACTIVE DUTY

2nd Lt. Rosemary Aliesch
2nd Lt. Jessie S. Brewer
2nd Lt. Beulah M. Cooper
2nd Lt. Martha G. Coyle
2nd Lt. Gloria D. Denkhaus
2nd Lt. Cathryn C. Freeman
2nd Lt. Frances B. Gallagher
2nd Lt. Kathryn M. Glotfelty
2nd Lt. Nancy E. Hauser
2nd Lt. Carolyn R. Haynes
2nd Lt. Ann Hedquist
2nd Lt. Ann Krajacic
2nd Lt. Frances E. Rahll
2nd Lt. Margaret E. Ranger
2nd Lt. Elaine L. Reith
2nd Lt. Lucy San Miguel
2nd Lt. Judith A. Silliman
2nd Lt. Marcia L. Turpin
2nd Lt. Dorothy L. Wooden

REGULAR ARMY APPOINTMENT

Capt. Annie F. Kennedy

PROMOTIONS

Capt. to Major

Janet Hammill
Elinor Pearson
Virginia McGary

2nd Lieutenant to 1st Lieutenant

Kenneth Larsen

SEPARATIONS

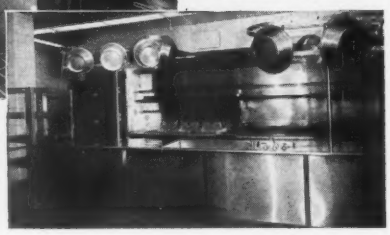
Retired

Lt. Col. Elizabeth Carloss

Relieved from Active Duty (Reserves)

Capt. Jean Cooley
1st Lt. Joan Forester
1st Lt. Maria Martin
1st Lt. Patricia Newyear
1st Lt. Bonnie Peaslee
1st Lt. Sarah K. Sites
1st Lt. Ruth V. Vest
1st Lt. Anna J. Wilson
1st Lt. Elizabeth Yelton

Selective Counter Service



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Rike Kumler says Van service on 5 projects "incomparable"!

The judgment of this enterprising department store is valid because it serves from 1400 to 3000 lunches, from 600 to 2200 dinners to customers, 30 plus meals a minute to employees with its selective counter service above illustrated. Van helped with understanding of this store's needs for flexible arrangement; designed, fabricated supervised installation of modern stainless equipment for cafeteria, Coin Room (little restaurant), bakery, main kitchen, mezzanine dining room over a recent three year period.

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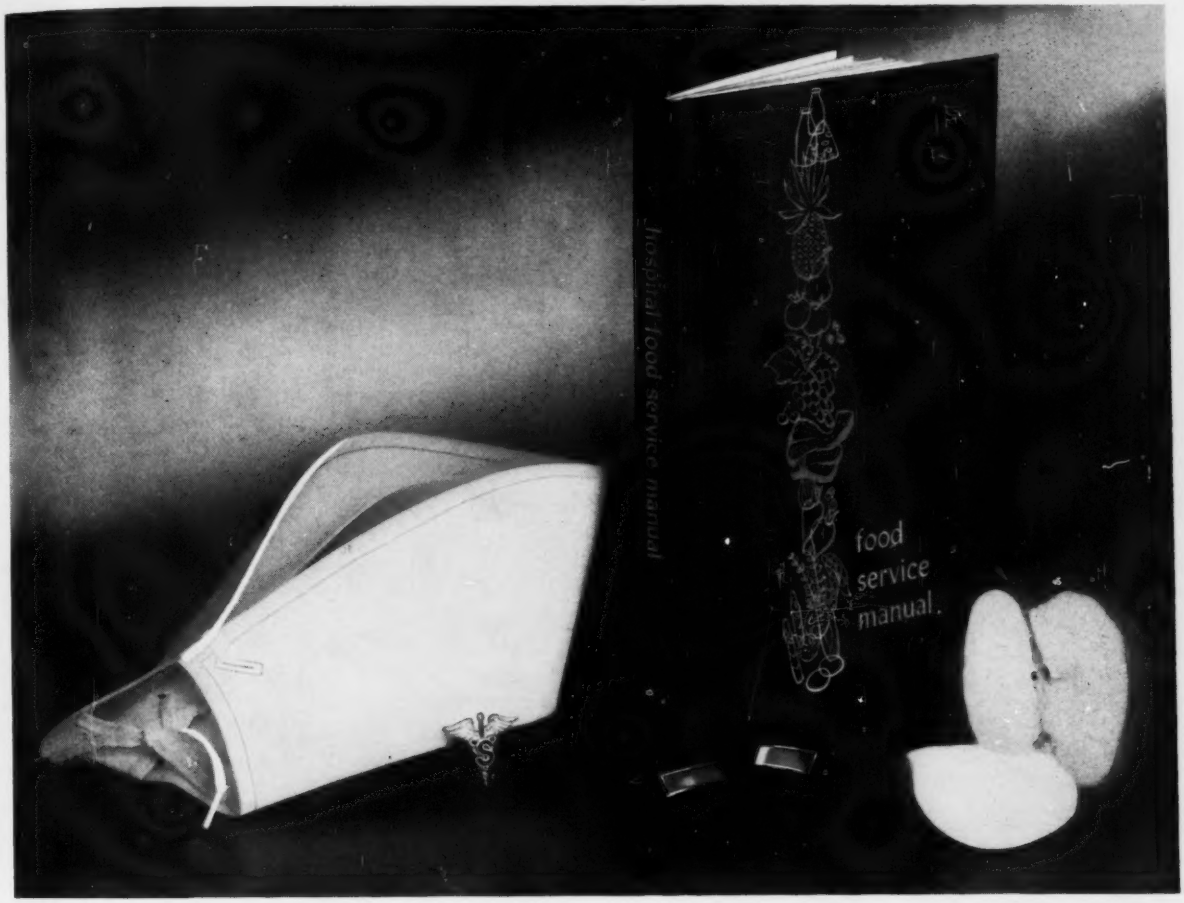
News of State Associations

Alabama Dietetic Association. On December 2 and 3, the Alabama Dietetic Association met in Birmingham. The program featured a symposium on food additives and labeling, with presentations on the following topics: additives, general information; packaging materials for foods; pesticides on foods; work of FAO/WHO on food additives; the homemaker's point of view; and our responsibility as professional women. A report from the Fifth International Congress was also presented, as well as a paper on "Methods Improvement" by Edward S. Ferrell, Director, Management Analysis Department, University of Alabama Hospital.

Georgia Dietetic Association. In



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THE ARMY MEDICAL SERVICE now offers qualified dietitians the opportunity to complete studies leading to the Master's degree. Through the Graduate Dietitian Program, accepted candidates receive an officer's pay and allowances while studying at a college or university of their choice. The major field of study may be Foods and Nutrition, or Institution Management.

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- ☐ **STUDENT DIETITIAN PROGRAM**
- ☐ **DIETETIC SUMMER PRACTICUM**

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City_____ **Zone**____ **State**_____

September, twenty-two members of the *Augusta Dietetic Association* attended the first meeting of the year to hear Emery J. Cook, Augusta Public Health Department, speak on "Sanitation and Prevention of Infectious Diseases." Officers for 1960-61 of the Augusta Association are: President, Evelyn McCrary; Vice-President, Sara Morris; and Secretary-Treasurer, Shirley Shilling.

Florida Dietetic Association. Members of the Florida Dietetic Association held their fall meeting in Gainesville on November 2, 3, and 4. The program included:

"Organization for Action in Hospital Administration"—L. R. Jordan, Administrator, University of Florida Health Center

"Dietary Problems in the Practice of Surgery"—Dr. Paul H. Jordan, University of Florida Medical School

"The Role of Dietary Factors in Heart Disease"—Dr. Lamar E. Crevasse, University of Florida Medical School

"Trends in Food Management Operations: Contract Feeding vs. Self-Operation—Where Are We Going?" —Gay Wellborn, Director of Campus Food Service, University of Florida

"Factors in Experimental Obesity in Relationship to Clinical Problems" —Dr. William C. Thomas, Jr., University of Florida Medical School

"Diabetes—Insulin or Pills *Plus* Diet" —Dr. Joseph Shipp, University of Florida Medical School

In October, the Community Nutrition Section of the *Miami Dietetic Association* prepared an exhibit of nutrition and related books at the Greater Miami Library. In connection with the exhibit, two sessions with round table discussions and films were presented, as well as two TV programs.

The *Pinellas County Dietetic Association* in September met at the George M. Lynch Elementary School Cafeteria in St. Petersburg and were served a typical Type A school lunch. This was followed by a question-and-answer session on school lunch conducted by Ruth Kelly, Field Instructor of School Lunch in Pinellas County.

Kentucky Dietetic Association. Kentucky dietitians met at Mammoth Cave on November 4 and 5. Highlights of the A.D.A. Annual Meeting in Cleveland were reported by delegates. In addition, Ann Russell, American Institute of Baking, spoke on "Teaching Nutrition Through Visual Aids."

Officers for 1960-61 of the Kentucky Association are: President, Virginia Colley, Home Demonstration Agent, Benton; President-Elect, Ann Hains, Harlan Memorial Hospital, Harlan; Treasurer, Theresa Goetz, VA Hospital, Lexington; and Secretary, Anita Thompson, Nazareth College, Louisville.

Louisiana Dietetic Association. "Reflections" was the theme of the silver anniversary meeting of the Louisiana Dietetic Association, held in Lafayette on November 18 and 19. The program included:

"1960 White House Conference—Resume and Consequences"—Ansta Barr, Children's Bureau Regional Office, Dallas; and "Louisiana Participation" — Lawrence Higgins, Louisiana Youth Commission, Baton Rouge

"Grading of Canned Foods"—Earl F. Burk, Inspector, U.S. Department of Agriculture, Hammond, Louisiana

"Oral Communication" — J. Perry Brandao, Esso Standard Oil Company, Baton Rouge

"Living Patterns Behind the Iron Curtain"—Dr. Gaither A. McConnel, Head, Department of Education, Newcombe College, Tulane University, New Orleans

Clara Zempel from the A.D.A. Headquarters Office attended the meeting as official representative of the national Association and spoke on "The Potentiality of the Dietitian Today."

Maryland Dietetic Association. At its opening meeting in September, the Maryland dietitians heard Dr. Don Carlos Faith, Professor of Educational

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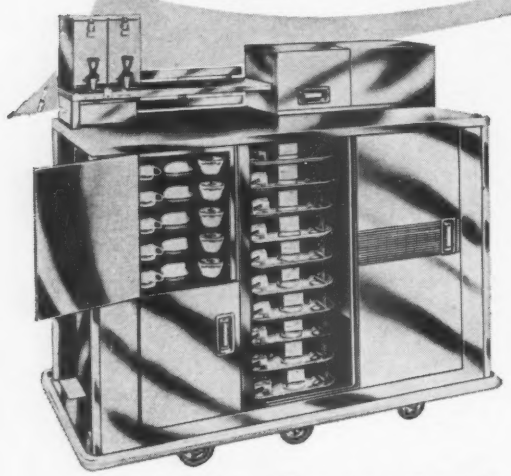

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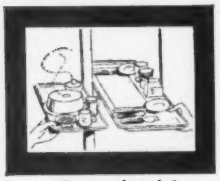

3 Trays placed in corresponding hot and cold compartments.

4 At serving point Match-A-Tray hot items transferred to patient-tray.

5 Tray delivered to patient — hot foods hot — cold foods cold.

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Modilac does not simulate breast milk but it does provide nourishment comparable to that received by the infant who is successfully breast fed.

Modilac is modified to meet infant needs. The combined carbohydrates are absorbed throughout the digestive process, maintaining uniform blood sugar levels. Corn oil (which provides ample linoleic acid) replaces butterfat so intake of saturated fatty acids is reduced. Supplemented with vitamin C and other needed vitamins.*

In normal (1:1) feeding dilution, Modilac provides 2.03% milk protein, constituting 13% of the caloric value. Nutritionally, this coincides with authoritative† recommendations for infants on "artificial" formulas.

†Gordon, Harry H. and Ganzon, Angelita F., J. Ped. **54**:503-528, 1959.

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Vitamin A 3000 U.S.P. Units	Thiamine 0.55 mg.
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Psychology, Georgetown University, Washington, D. C., speak on "Complexities of Personnel Management." His address centered around three problems: *why* personnel management is complex, *how* is it complex, and *what* can be done about it.

A meeting scheduled for February 6 will feature panel discussions on geriatrics, rehabilitation, meal delivery, and nutrition. In April, the program will feature Dr. Herb True in a talk on "Creative Thinking."

Michigan Dietetic Association. November 3 was the date of the fall meeting of the Michigan Dietetic Association in Grand Rapids. The program featured:

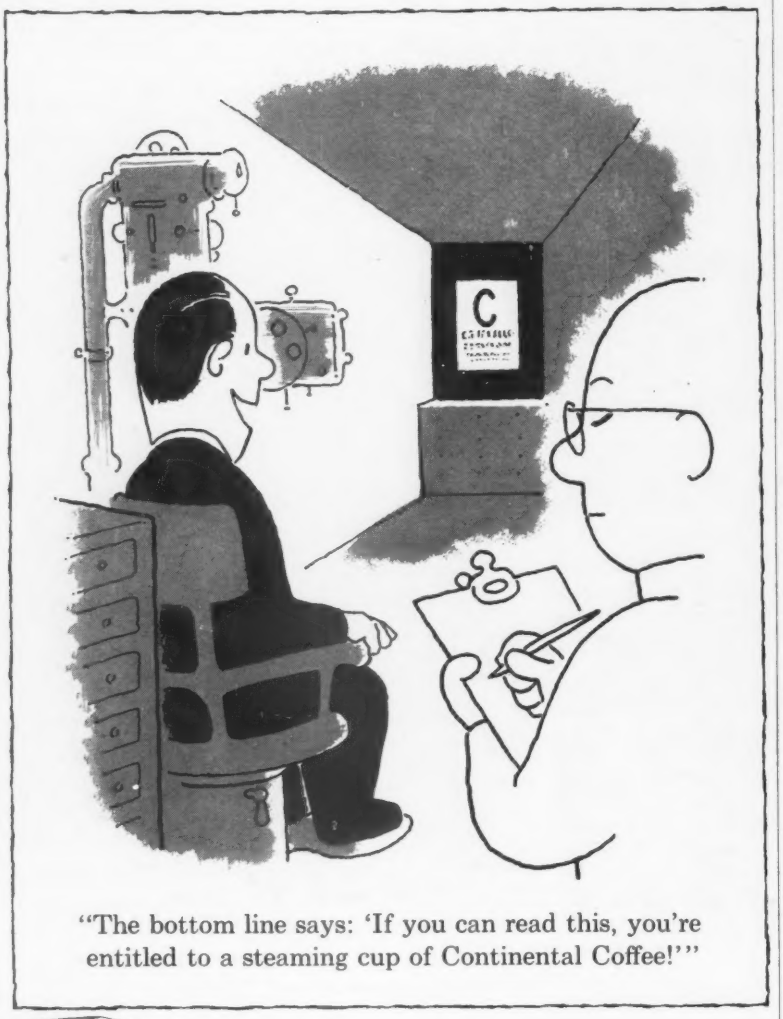
"Amino Acid Research"—Dr. A. G. Hogan, Research Consultant, National Live Stock and Meat Board

"Biochemical Effects of an Imbalance of the Amino Acid, Threonine"—Dr. Dorothy Arata, Michigan State University, East Lansing

"Phenylketonuria"—Dr. C. O. Rupe, Ames Research Laboratory, Elkhart, Indiana

"Brightening the Blocks"—a tray flavor demonstration by Mrs. E. J. Casey, Jr., of the Mary Riste Guild, Butterworth Hospital, Grand Rapids

"Humanizing the 'Complete Protein' in an Interviewing Session"—Sydney Youngsma, Calvin College, Grand Rapids



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Missouri Dietetic Association. On November 11, members of the Missouri Dietetic Association met in St. Louis. Featured on the program were Lt. Col. Katherine Manchester, AMSC; Dr. Louis M. Kohler, St. Louis State Hospital; and Raymond Rowland, President, Ralston Purina Company.

Col. Manchester urged dietitians to try new foods on trays. She also reported that dietitians on her staff are present on the wards when trays are served. When a patient complains about the temperature of his food, he is given a thermometer and asked to show the dietitian the temperature he prefers. This information is then noted on his card.

Dr. Kohler, Psychiatric Superintendent at St. Louis State Hospital, pointed out that enough food regularly given at the right time in infancy by a person who loves the baby lays the groundwork for a relaxed personality. Food, too, can play a part in therapy of mental patients, and "eating together" can help to stimulate patients' appetites, giving them a sense of equality and of belonging. At the St. Louis State Hospital, efforts are being made to increase the opportunities of "eating together" among the patients and between patients and members of the hospital staff.

Mr. Rowland discussed business conditions, pointing out that employment is still at the rate of more than 67 million people and that service industries, which represent 40 per cent of the U.S. income, are still enjoying good business, even though some of the "hard goods" industries have suffered declining sales in 1960.

Officers of the Missouri Association are: President, Rosemary Burns, St. Louis; President-Elect, Evelyn Carter, Jefferson City; Secretary, Pattie Hay; and Treasurer, Norma Janes, St. Louis.

Nebraska Dietetic Association. On November 3, the Nebraska Dietetic Association and the College of Adult Education, University of Omaha presented a "Nebraska Dietetics Conference." The program included:

"Management and Labor in Hospital Dietary Departments"—a panel discussion

"The Importance of Diet Therapy"—Dr. Whitman M. Reynolds, Medical Director of Selection, Equitable Life Assurance Society, New York, New York

"Trends in Hospital Food Management, and a Look Toward the Future"—Ruth Kahn, Hospital Foods Management Inc., Los Angeles.

North Carolina Dietetic Association. November 3 and 4 were the dates of the fall meeting of the North Carolina Dietetic Association in Asheville. The opening meeting featured talks on "New Trends in Food Service Equipment" by L. D. Rocamora, Asheville

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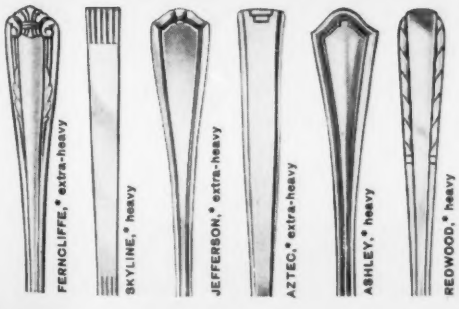

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Showcase and Fixture Company, Chicago. Other speeches were:

"Completed Staff Work"—Ted Marr, Personnel Director, American Enka Corporation, Enka

"Work Analysis and Improvement"—J. H. Blackwell, Management Analyst, VA Hospital, Oteen

"Feeding for Sex or Sustenance"—Charles Vernon, M.D., Professor of Psychiatry, North Carolina Memorial Hospital, Chapel Hill

The meeting also included a showing of the A.D.A. film, *View from the Mountain*, and a tour of the Gerber Products Company plant in Asheville.

Texas Dietetic Association. Texas has a new local group, the *Rio Grande Valley Dietetic Association*. Organized in April, with nine charter members, it now boasts fifteen members from Edinburg, San Juan, Harlingen, Corpus Christi, Kingsville, and Laredo. Officers are: President, Daphne H. Smith, Harlingen; President-Elect, Mercedes Shipman, Edinburg; and Secretary-Treasurer, Grace Oliveria, Corpus Christi. Two meetings have been held this fall—one in September and one in November, at which Mrs. George Lenig, Red Cross Disaster Consultant, spoke on "Disaster Planning."

The opening fall meeting of the *South Texas Dietetic Association* in Houston featured a talk on "Food with a Flare" by P. Tomek of Kaphan's Restaurant.

Virginia Dietetic Association. The thirty-second annual fall meeting of the Virginia Dietetic Association was held in Roanoke, November 11 and 12. The program featured:

"The White House Conference on Children and Youth and the Dietetic Association"—Icie Macy Hoobler, Ph.D., The Merrill-Palmer Institute, Detroit

"Federal Meat Inspection"—Lt. Col. Wesley A. Clem, Jr., QM School, Ft. Lee

"Food and Psyche"—Dietrich W. Heyder, M.D., Director, Norfolk Mental Health Center

West Virginia Dietetic Association. Beckley was the scene of the fall meeting of the West Virginia Dietetic Association on November 11 and 12. The first day's program included tours of the Bowl-Wick Restaurant and Beckley Memorial Hospital, in addition to two speeches: "Diet and Coronary Heart Disease" by Dr. Albert Kistin; and "History of Tuberculosis" by Dr. Thomas Christie. The banquet speaker, Rev. Shirley Donnelly, D.D., discussed "History of Early Southern West Virginia." The second day's agenda featured the regular business meeting with reports by the officers and delegate to the A.D.A. House of Delegates.

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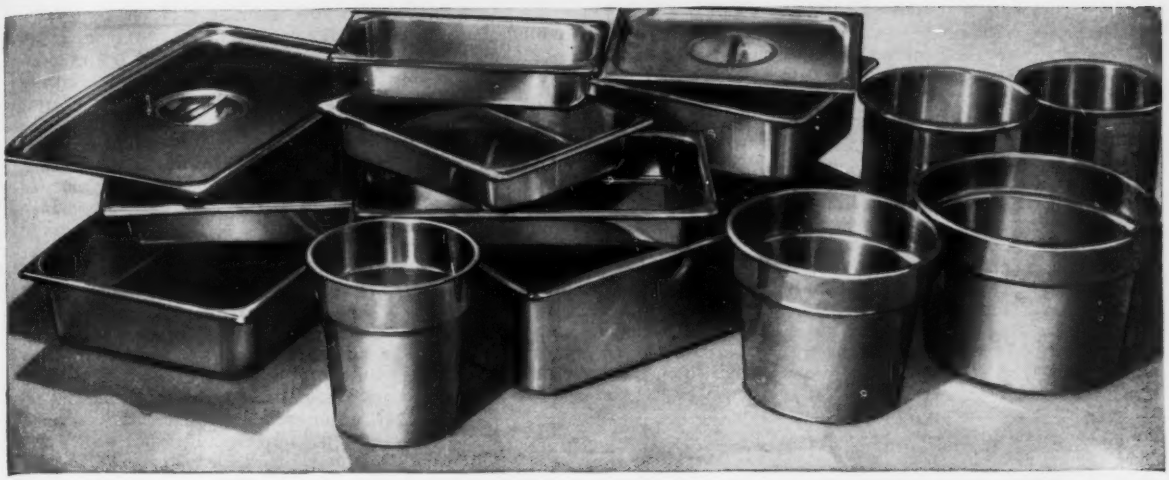
Career Guidance in the States

Career Guidance activities do not always require group effort, extensive committee work, and elaborate programs. Remember that individual contacts and counseling, guided tours, and invitations for informal visits to see dietitians at work, are among the best "promotional" activities available. Use the A.D.A. film, View from the Mountain, *and follow the showing by distribution of pamphlets.*

Minnesota. The annual three-day workshop on "Careers in Home Economics," co-sponsored by the state dietetic and home economics associations, was held last year on the St. Paul Campus of the University of Minnesota, for all colleges in the state which offer major courses in home economics. Its purpose was to offer vocational guidance to high school students and acquaint them with job opportunities in various phases of home economics and also, to help them select a college and inform them of precollege course requirements.

Last year's theme was "Passport to the Future." Each registrant's picture was taken and placed in the program booklet, made to look like a passport. The workshop included talks by outstanding people in different fields of home economics, tours to see various careers in action, individual and small group conferences, and on the lighter side, a banquet and style show.



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New York. Dietitians prepared a "Directory for Planning a Career in Dietetics," distributing more than 500 copies. A compact, fold-sheet pamphlet, the "Directory" contains information on: (a) job opportunities in community nutrition, food administration, research, teaching, and diet therapy; (b) educational requirements to become a qualified dietitian, a list of colleges in New York State which offer courses fulfilling these requirements for A.D.A. membership, and a map showing the location of each; (c) fact sheet on, and list of institutions in New York state offering a two-year course in food service supervision; and (d) a list of several free publications available from A.D.A., together with the address to which to write, as well as the name and address of a local contact in each of the nine local-association areas in the state, for obtaining personalized information or arranging showing of the film, *View from the Mountain.*

Ohio (summary of career guidance efforts in Cincinnati). "The goal in career guidance is to get information on the opportunities in dietetics to the school students, their counsellors, and their parents. We employ the use of catalysts or carriers to help get the job done, to make dietetics as saleable or acceptable as comparable professions. To open channels of communication, we use the following helpers: (a) the Academy of Medicine—the physician—to give prestige and dignity, to command attention and to establish the information as authoritative; (b) PTA and other parent groups—to inform the family of the need for the profession of dietetics and its total relation to the community; (c) the women's medical and hospital auxiliaries—to open channels with youth groups, such as health career clubs, Scouts, 4-H, and other student groups, which can assist with many problems in organizing and scheduling career meetings on youth programs; and (d) health career committees that work as a united team interpreting opportunities. It is both feasible and mutually beneficial to become allied with home economics groups, nurses, and other allied professions in the health field."

California, Idaho, North Dakota, and Texas report successful and satisfying participation in health careers exhibits and workshops. In addition, **Alabama** and **Virginia** last year furnished copies of excellent para-medical and/or health career booklets, representing the united efforts of several organizations. When the work load and cost of such projects are shared, the result is much more effective and far-reaching than if undertaken by any one organization, no matter how dedicated.

Questions We Must Answer. Through the experiences of **Oklahoma** dietitians, we gain information as to what the younger generation wants to know about dietetics and dietitians. Students ask such questions as: "Do you wear hair nets?"; "How much chemistry did you take in college?"; "What are the salaries?"; and "Can you get a job right after college?" Probably the most common questions are: "What does a dietitian do?" and "What is dietetics?"

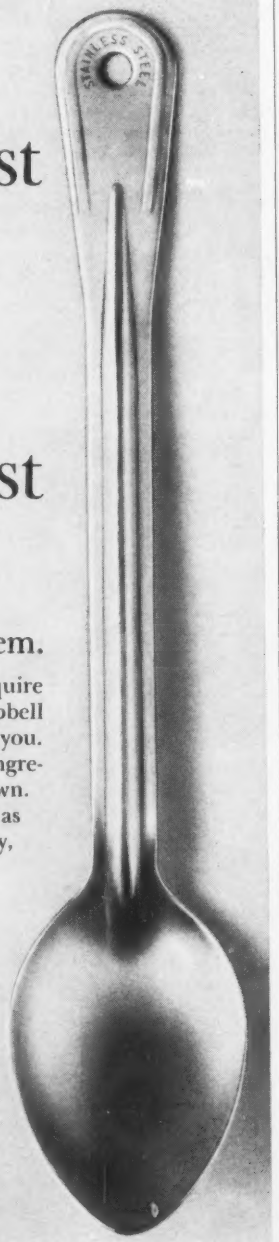
West Virginia conducted a career guidance clinic at Charleston which provides us with further questions, such as "What about scholarships?"; "How can you combine nutrition and journalism?"; "Why do we have to take chemistry?"; and "If I take up dietetics, must I work in a hospital?"

Association Activities

1961 A.D.A. Annual Meeting. Plan now to attend the 44th Annual Meeting of The American Dietetic Association to be held in St. Louis, October 24 to 27, 1961.

A.D.A. Representation. Edith Jones, National Institutes of Health, Bethesda, Maryland, represented our Association at the Second General Session of the 14th Annual Convention of the *American School Food Service Association* in Washington, D. C., on October 4.

Can the most versatile soups for quantity food service also be the most economical?



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The *Camp Fire Girls* Golden Jubilee convention was held November 1 to 3 in New York City, with Dorothy Kinnear attending as our representative. The sessions dealt with our society today, the girl today, and the implications for Camp Fire Girls in the next decade.

Helen Walsh, California Department of Health, Berkeley, represented A.D.A. at the Policy Committee meeting of the *National Citizens Committee*, November 2 and 3, held during the American Public Health Association convention in San Francisco. "The American Image Abroad" was the theme of the meeting.

Anne White, Chicago, served as our representative at the Seventh Annual Region IV *Conference on Civil Defense* in Highland Park, Illinois, November 3 and 4. The program was directed toward vital information necessary in protecting the family, home, and community against disaster.

The American Dietetic Association was represented at the meeting of the *Japan Nutritionist Association*, November 4, in Tokyo.

Obituary

Alice Bennett Peyton. The A.D.A. office has been notified of the death on November 2, 1960, of Alice Bennett Peyton, a member of the Association since 1933. Miss Peyton was formerly Assistant Professor of Nutrition, Western Reserve University, Cleveland, and a one-time faculty member of St. Catherine's College, St. Paul. She is the author of *Practical Nutrition*, published in 1957 by Lippincott.

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News of Products and Services

A sixteen-compartment "Hottle" rack identified as Metro No. A713M, with a heavy, shock and sound absorbing plastisol insert, has been introduced by *Metropolitan Wire Goods Corporation.* The new rack features eight-frame design and is two and one-half times stronger than the older twin parallel wire design. The new model is available in different sizes to accommodate various dishwashing machines. Stacking lugs are an added convenience.

Metropolitan Wire Goods Corporation also announces production of an economical, multi-purpose cafeteria tray holder. Available in 24-, 30-, and 36-in. lengths, the tray has 16, 20, and 24 slots, respectively. All are 11 in. wide. Clearance between wires is 1 in., permitting sufficient air space for quick drying. At the head of a cafeteria line, the tray holder adapts to use as a dispenser. It may be placed on any flat surface or used with a mobile Metro Erecta-Shelf unit.

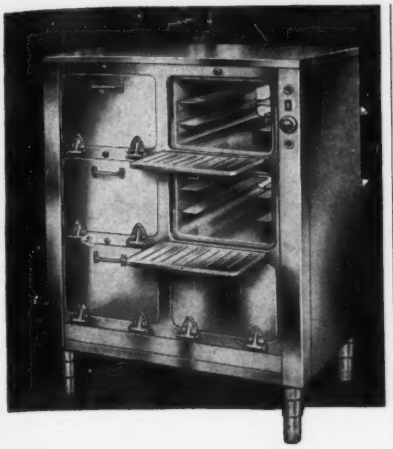
Four new items have been added to the *Heinz Baby Foods* line. Three are juices: "Orange-Apple-Banana," "Orange - Pineapple," and "Pineapple - Grapefruit." All have been fortified with ascorbic acid to provide 40 mg. per 100 cc. Also new is a nutritious green vegetable, "Junior Creamed Peas."

A film, "Modern Meal Planning with Convenience Foods," is available from the *Campbell Soup Company* for use with its student teaching kit. A teacher's manual, "Modern Meal Planning with Soups," offers suggestions on how to use the film and methods of presentation. All recipes used in the film are included in the twenty-page manual.

Campbell's has also introduced a new product, "Barbecue Beans." To Great Northern, baby Limas, and California pink beans has been added a tangy, tomato barbecue sauce with an open-fire flavor. Two recipes using the beans in combination with meat are available.

Packaging Equipment Division of Ex-Cell-O Corporation has announced a 1-gal. paperbound milk carton which completes its full line of Pure-Pak cartons from half-pint to gallon. The new carton features an easy opening, sanitary pouring spout, and top printing for easy product identification . . . Ex-Cell-O also recently introduced its plastic half-gallon Pure-Pak Model T-P, polyethylene plastic, milk packaging machine.

The *National Live Stock and Meat*



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Board has released three new publications of interest to dietitians. From the Home Economics Department comes a forty-page booklet on home-size recipes, titled *Year 'Round Meat Recipes*, which presents recipes for: beef; veal; pork; lamb; sausage, ready-to-serve and canned meats; and variety meats, as well as a section on pies, cakes, and cookies. The center spread is devoted to menus featuring a number of the recipes, while on the last pages, meat cookery time-tables for braising, broiling, cooking in liquid, and roasting, are presented.

From the Nutrition Department of the *National Live Stock and Meat Board* come two new booklets. *You Can Reduce* is an attractive, two-color, well designed and illustrated booklet on weight reduction. The discussion answers the questions: what are your rewards? and what is the price you pay? after which are listed ten guides to success in a reducing campaign. The program which the booklet describes is a step-wise program developed through research at Cornell University under the direction of Charlotte M. Young, Ph.D. It features a high-protein, moderate-fat regimen. Tables on desirable weights, caloric needs of moderately active adults, approximate time required to achieve six weight-loss goals, as well as suggested menus for 1400- and 1800-calorie diets, are included. A novel idea of a "calorie budget" is put forth. Three pages of calorie values are included, as well a page for a three-week record of caloric intake and weight loss.

The Nutrition Department of the *National Live Stock and Meat Board* has also reprinted the Board's wall-sized colored food value charts in black and white in notebook size, 8½ by 11. The charts are bound in a twelve-page booklet and include bar graphs on protein, iron, calcium, vitamin A, thiamine, riboflavin, niacin, ascorbic acid, and calories. The last page is a "food value work form," for recording food intake and nutritive value. Each of the charts indicates the daily recommendation for the nutrient in question, as well as the amount of that nutrient provided by a given amount of food.

"The Golden Fruit," an eight-page booklet recounting the story of California and Arizona citrus, is available to grade school teachers and home economists from *Sunkist Growers*. Full color photographs picture modern growing practices, include a detailed explanation of "budding," the process by which grapefruit, lemons, and oranges are grown on one tree. Transportation and marketing methods are described. The booklet is part of a three-part study program, which includes: (a) a movie, "Citrus, The Golden Fruit," a color and sound film running 14½ min.; (b) a film strip of fifty frames, "The Golden Groves"; and (c) the booklet described above. All were prepared under the guidance of education experts and were designed for health education programs.

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